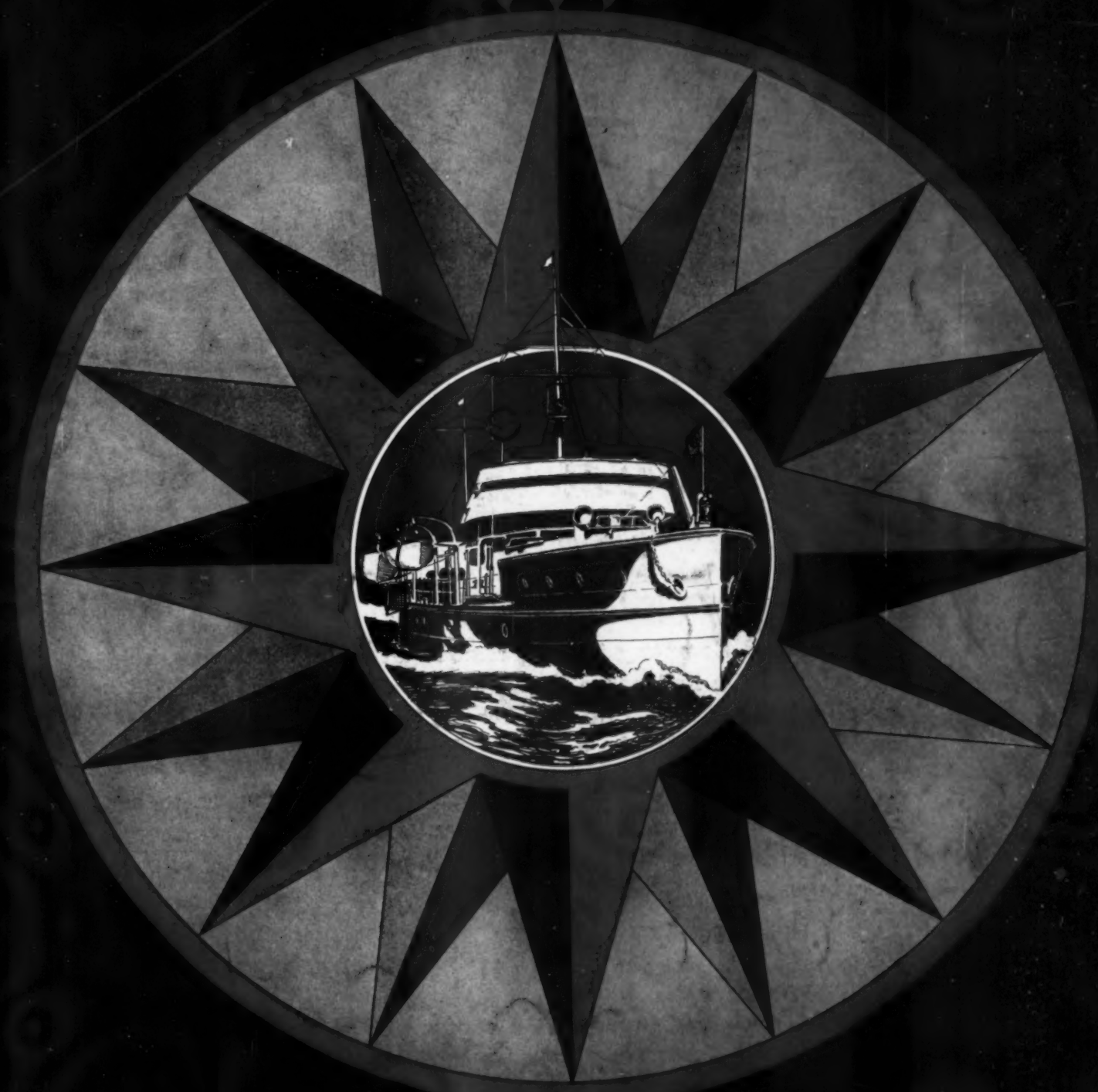
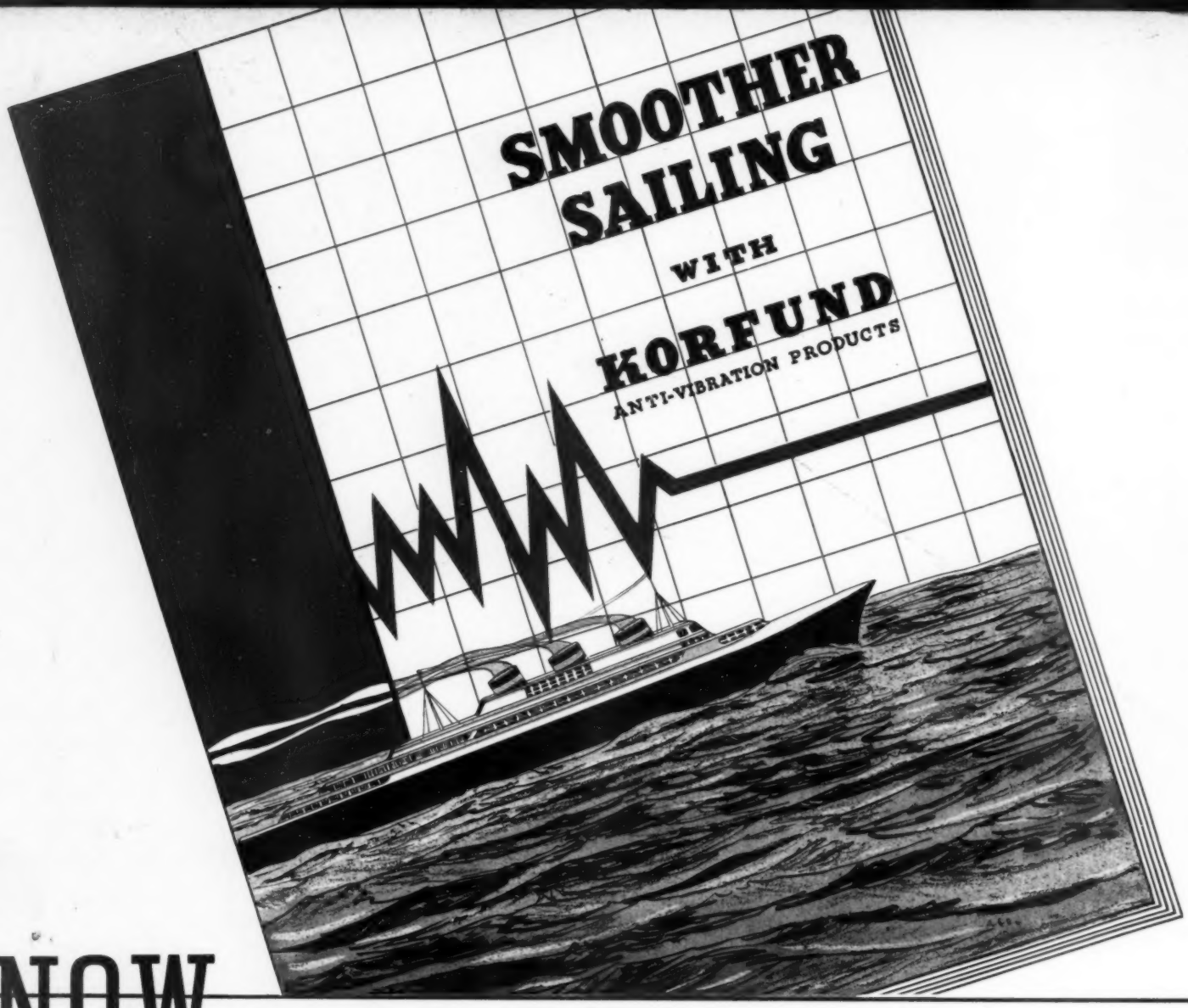
# DIESEL PROGRESS

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR



JANUARY, 1938 CIRCULATION OF THIS ISSUE—IN EXCESS OF 14,000 COPIES 25c




# NOW *For the first time!*

**Plans and specifications for vibration isolation of main propulsion Diesel engines in marine installations.**

The Korfund Company takes pleasure in offering to the marine Diesel field the first complete anti-vibration bulletin, especially prepared to assist Marine Engineers, Naval Architects, owners, and operators of Diesel vessels in solving vibration problems.

This booklet, free upon written request, contains authentic technical information presented in understandable form, profusely illustrated by performance charts, photographs, and engineering drawings.

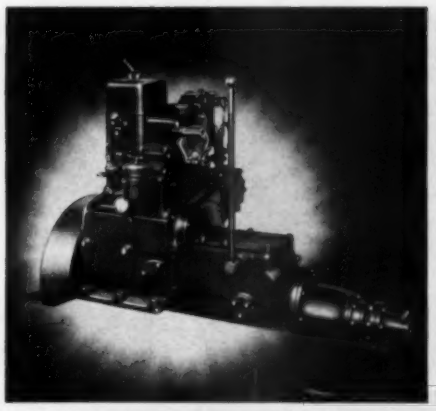
*Write for your copy now! It will be sent promptly with the compliments of the Korfund Company.*

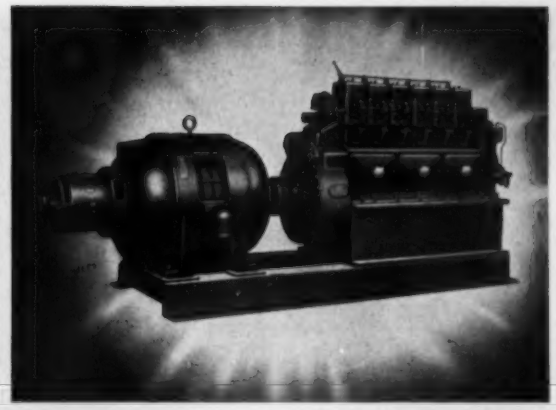
## THE KORFUND COMPANY, Inc.

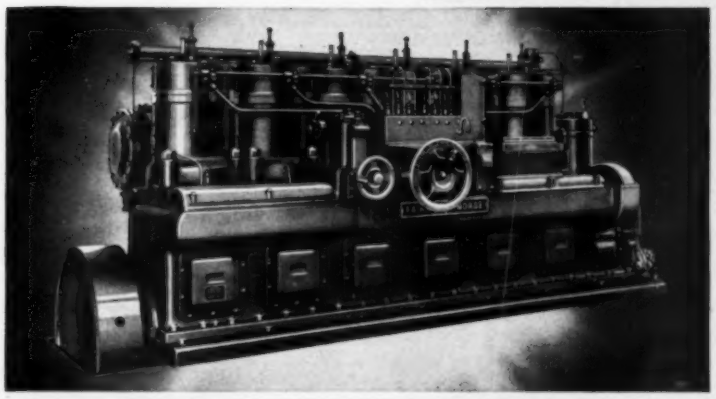
**48-26 THIRTY-SECOND PLACE • LONG ISLAND CITY**

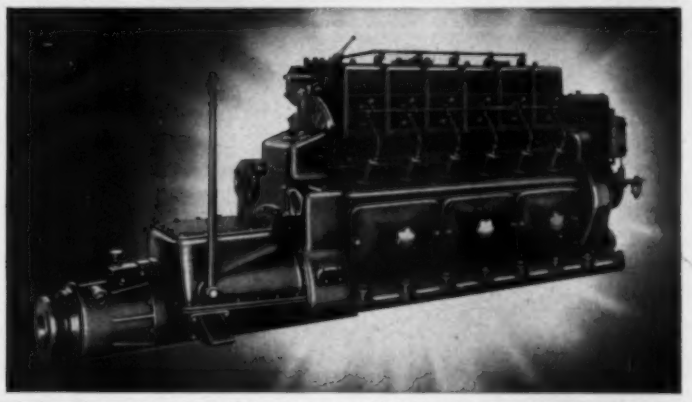
DIESEL PROGRESS for January, 1938. Volume IV. No. 1. DIESEL PROGRESS is published monthly by Diesel Engines, Inc., 2 West Forty-fifth Street, New York, N. Y. Rex W. Wadman, President. Acceptance under the Act of June 5, 1934, at Brooklyn, New York, authorized May 14, 1935. Subscription rates: United States and Possessions $3.00, Canada and all other countries $5.00 per year. Single copy price 25 cents in U. S. A., 50 cents for all other countries.

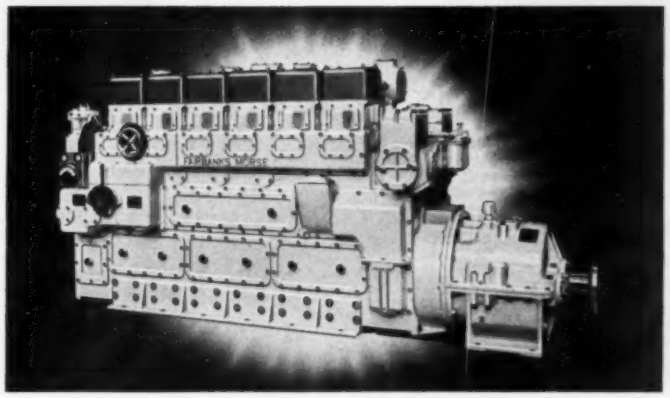
# F-M Builds the Diesel You Require













THE Fairbanks-Morse line of Diesel engines covers marine needs from driving the smallest auxiliary equipment to powering a freighter. The line is so complete that there is an F-M Diesel built especially to handle the type of job you have without change or compromise—no need to be content with, "It will do."

Select your Diesel from the F-M line and thus assure yourself the maximum efficiency and accuracy of Diesel power. In addition, secure the results of F-M Diesel experience—the most extensive and diversified Diesel experience in the world.

Bulletin AOB200.10-23 will give you valuable information for making a selection. Write for it. Fairbanks, Morse & Co., General Offices: Chicago. New York—Boston—Baltimore—New Orleans—Jacksonville—Dallas—Los Angeles—San Francisco—Portland, Oregon—Seattle. Branches with service stations in principal ports.

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DIESEL ENGINES
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**Diesels**

# INTERNATIONAL TRACTRACTORS . . . .
# for the Tough Work, at LOW COST



International TracTracTor Diesel Engines start on gasoline and shift automatically to Diesel operation after warming up for one minute or less. They are full Diesels in every respect—compression ratio is 17 to 1.

Regular features include: Chrome-nickel, molybdenum alloy cylinder head; special alloy, heat-treated, individually replaceable cylinders; aluminum alloy pistons with silchrome steel top inserts; full-floating piston pins; Diesel fuel injection pump with stainless, rust-resisting parts; easily replaceable injection nozzles; variable-speed governor; Tocco-hardened crankshaft; easily replaceable precision-type main and connecting-rod bearings; full pressure lubrication; thermostat-controlled cooling.



The International T-20 TracTracTor equipped with bullgrader. Shown on excavation work, a job for which this compact outfit is ideally suited.




***Above:*** **Powerful International TD-40 Diesel TracTracTor operating a 4-wheel scraper. A popular combination on dirt-moving jobs everywhere.**

## MODEL TD-35 DIESEL TRACTRACTOR

**The popular features of International Diesel design are now available in the new International TD-35—a smaller Diesel TracTracTor at a lower price. Complete information supplied on request.**

INTERNATIONAL TRACTRACTOR design, quality, performance, and economy offer the answer to your power problem. Make a thorough study of the TracTracTors — there are five models, to fit your needs exactly. Ask for a demonstration. The International line also includes a wide variety of wheel-type industrial tractors, and power units in sizes up to 110 max. h. p. The nearest International Industrial Power dealer or Company-owned branch will give you complete information on any tractor or power unit in the line.

INTERNATIONAL HARVESTER COMPANY
Harvester Building (INCORPORATED) Chicago, Illinois

INTERNATIONAL HARVESTER *Quality* PRODUCTS

# INTERNATIONAL Industrial Power



# Lubrication Engineering

## Here's the Idea



Sure, there are lots of good lubricants on the market. But "Correct Lubrication" makes machinery earn its biggest profit. That's where Lubrication Engineering comes in.

## This Reason




Socony-Vacuum's Oils and Greases are engineered to the job. They've got something you can't get elsewhere—72 years' experience—the greatest in the oil business.



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Your operating problems are different? We know it! That's why trained Socony-Vacuum Engineers put their finger on places where Lubrication Engineering will save money.



## Works This Way

There's plenty of engineering data! Socony-Vacuum's lubrication library contains scientific facts about oil and machine efficiency. This is the basis for Lubrication Engineering.

## In Your Plant



Your best men will quickly okay Lubrication Engineering. It's proved good business to let Socony-Vacuum Engineers and your skilled men work out your problems together.

## This First Step




Talk with the Socony-Vacuum Representative when he calls. Get him to tell you about Lubrication Engineering. Show you how it makes for greater efficiency and bigger profits.

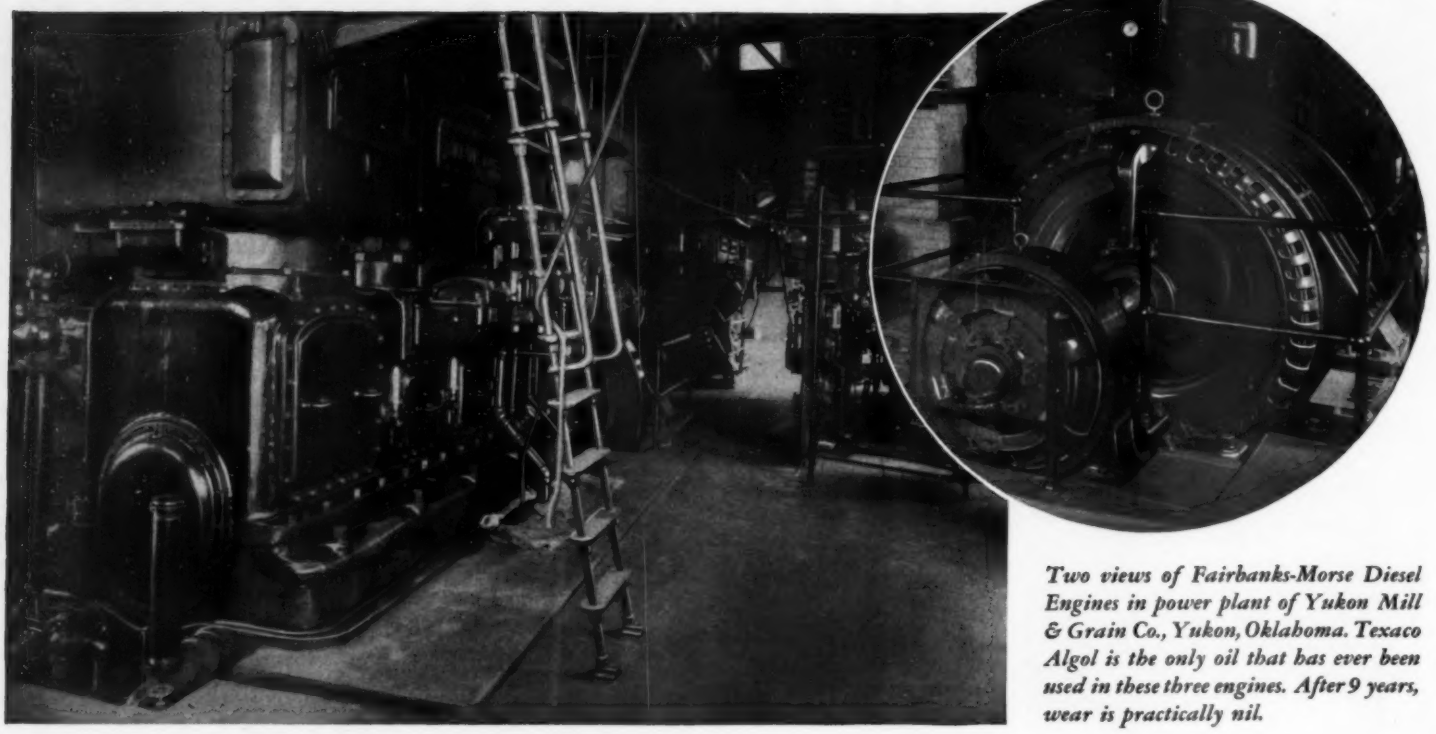
**SOCONY-VACUUM OIL CO., INC.**

STANDARD OIL OF NEW YORK DIVISION · WHITE STAR DIVISION · LUBRITE DIVISION · MAGNOLIA PETROLEUM COMPANY
CHICAGO DIVISION · WHITE EAGLE DIVISION · WADHAMS OIL COMPANY · GENERAL PETROLEUM CORPORATION OF CALIFORNIA

GARGOYLE Lubricants

MAKERS OF
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INDUSTRIAL
LUBRICANTS

# 9 Years on Algol
## *...with this result!*



*Two views of Fairbanks-Morse Diesel Engines in power plant of Yukon Mill & Grain Co., Yukon, Oklahoma. Texaco Algol is the only oil that has ever been used in these three engines. After 9 years, wear is practically nil.*

CHECKING REGULARLY for wear of pistons, cylinders, bearings, develops the astonishing fact that after 9 years of practically continuous day-and-night operation, very little wear has occurred.

Back of this trouble-free, wear-free performance is the lubricating oil they have had from the first hour . . . Texaco Algol.

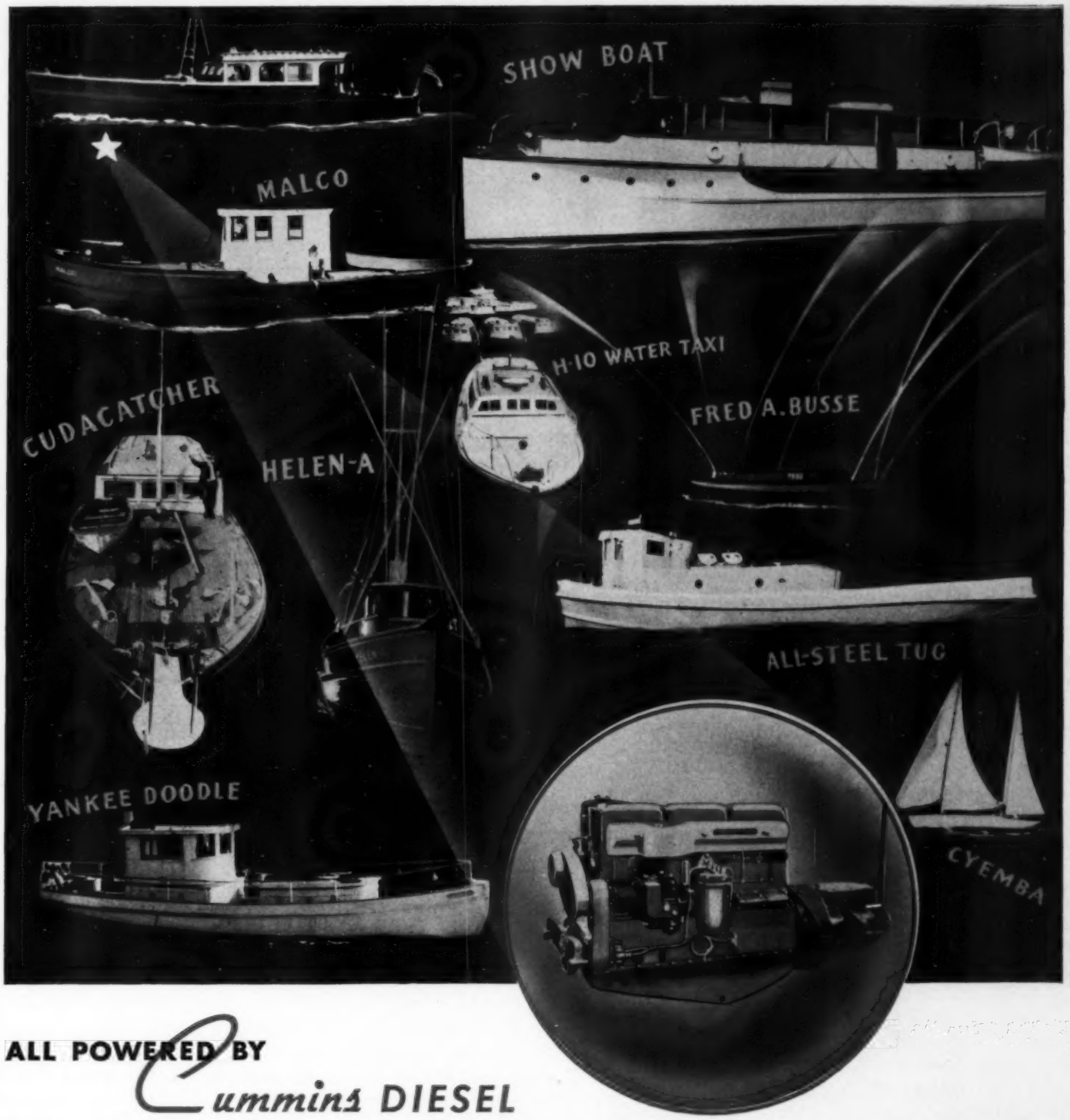
And now, after 9 years, 4,000 h.p. hrs. is produced on each gallon of oil consumed.

That's the record of the three 560 h.p. Fairbanks-Morse Diesel Engines in the power plant of the Yukon Mill & Grain Company, Yukon, Oklahoma. Performance of this kind is one reason why *more Diesel h.p. in America is lubricated with Texaco than with any other brand.*

Trained lubrication engineers are always available for consultation on the selection and application of Texaco Industrial Lubricants. Prompt deliveries assured through 2108 warehouse plants throughout the United States.

The Texas Company, 135 East 42nd Street, New York City.

**TEXACO** *LUBRICANTS for all types of DIESELS*




**ALL POWERED BY *Cummins* DIESEL**

**The Cummins Diesel combines power, speed and economy with instant starting . . . smooth, vibrationless running . . . freedom from fire hazard and low maintenance. Without these qualities there can be no *real pleasure* in yachting or cruising . . . no *profit* for fisherman or commercial boat operator.**

**The versatile performance of the Cummins Diesel meets every marine test . . . Should you be satisfied with anything less than a Cummins Deisel in your boat? Cummins Engine Company, 2303 Wilson Street, Columbus, Indiana.**

**SEE THE COMPLETE LINE AT THE NEW YORK MOTOR BOAT SHOW**

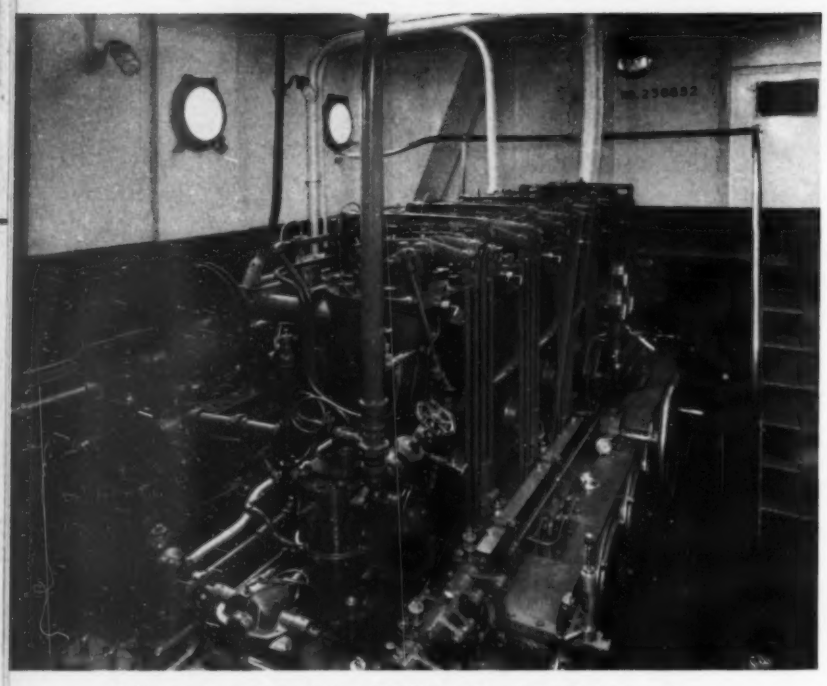
# CUMMINS *Dependable* DIESEL

PIONEER IN MODERN DIESEL DEVELOPMENT

# Tug "William B. Alexander" Powered by 275 h.p. Atlas





*The main engine of the "William B. Alexander" is a 6 cylinder, 275 H.P. direct reversible Atlas Imperial Diesel.*

**THE all steel tug "William B. Alexander" is the first of three identical tugs to be built by the Lester F. Alexander Company of New Orleans. She is 72′ long, 18½′ beam, 7½′ draft.**

**This new tug is powered by a 6 cylinder, 11½″ x 15″, 275 H.P. direct reversible Atlas Imperial Marine Diesel which turns a 70″ diameter, 38″ pitch, 3-blade manganese bronze Columbian propeller. She also carries a 2 cylinder 4¾″ x 6½″, 18 H.P. Atimco model Atlas Diesel auxiliary, direct connected to a 7½ K.W. electric generator and a Quincy air compressor.**

**The "William B. Alexander" was originally intended for operation on the intercoastal canal and on the lower Mississippi river. She was launched late in September and placed in towing service between Vicksburg and New Orleans. Her splendid performance under the able captaining of J. E. Stinson brought her to the attention of the United Fruit Company who have recently become her new owners.**

**The two Atlas Diesels with which she is powered were sold by Arthur Duvic's Sons, Atlas Diesel Distributors in New Orleans, whose experience in placing more than four hundred Atlas Diesels in Gulf Coast workboats is worthy of your consideration. A full range of sizes is available from a 5 H.P. auxiliary to a 525 H.P. main engine.**

## ATLAS IMPERIAL DIESEL ENGINE CO.

OAKLAND, CALIFORNIA — MATTOON, ILLINOIS

# ATLAS IMPERIAL

DEPENDABLE DIESEL POWER FOR THE INLAND WATERWAYS

# LUBRICATING
# 240 H.P. Fairbanks
# 120 H.P. Atlas
# 75 H.P. Union
# DIESELS




ORTH MATHIOT
Portland, Ore.

October 13, 1937

The J. H. Greene Co.
630 N.W. Tenth Avenue.,
Portland, Oregon.

Gentlemen:

We take a great deal of pleasure in writing you with reference to our experience with Macmillan Ring-Free Diesel Motor oil. We are operating three tugs equipped with Diesel power. The Superior with 240 H.P. Fairbanks, the Multnomah with 75 H.P. Union, and the Dayton with 120 H.P. Atlas.

Prior to using your oil we were blowing great quantities of oil out of the stack and it was necessary to wipe it down three to four times a day. This condition cleaned up immediately since using Ring-Free and are now running perfectly dry. We also notice that the sumps are running from 12 to 14 degrees cooler, the oil and fuel consumption has been cut considerably and a general improvement in all around engine performance.

Generally speaking, we are all so well pleased with the results we have obtained by using your oil that we do not hesitate to recommend it to anyone. It has done all and probably more than your representative Mr. Harry Brown claimed it would do.

We are enclosing two photos of our boats and you have our permission to use the pictures and this letter in any way you desire.

Yours very truly,
Orth Mathiot.
Orth Mathiot,
Owner.

➡ Regardless who made your diesel, regardless what work it has to do, RING-FREE will make it perform better than any other motor oil because RING-FREE reduces friction more than any other oil and because RING-FREE prevents the formation of carbon deposits. By reducing friction this oil reduces both fuel and oil consumption. You, too will be "well pleased with the results" when you let The Macmillan Man put RING-FREE in your diesel.

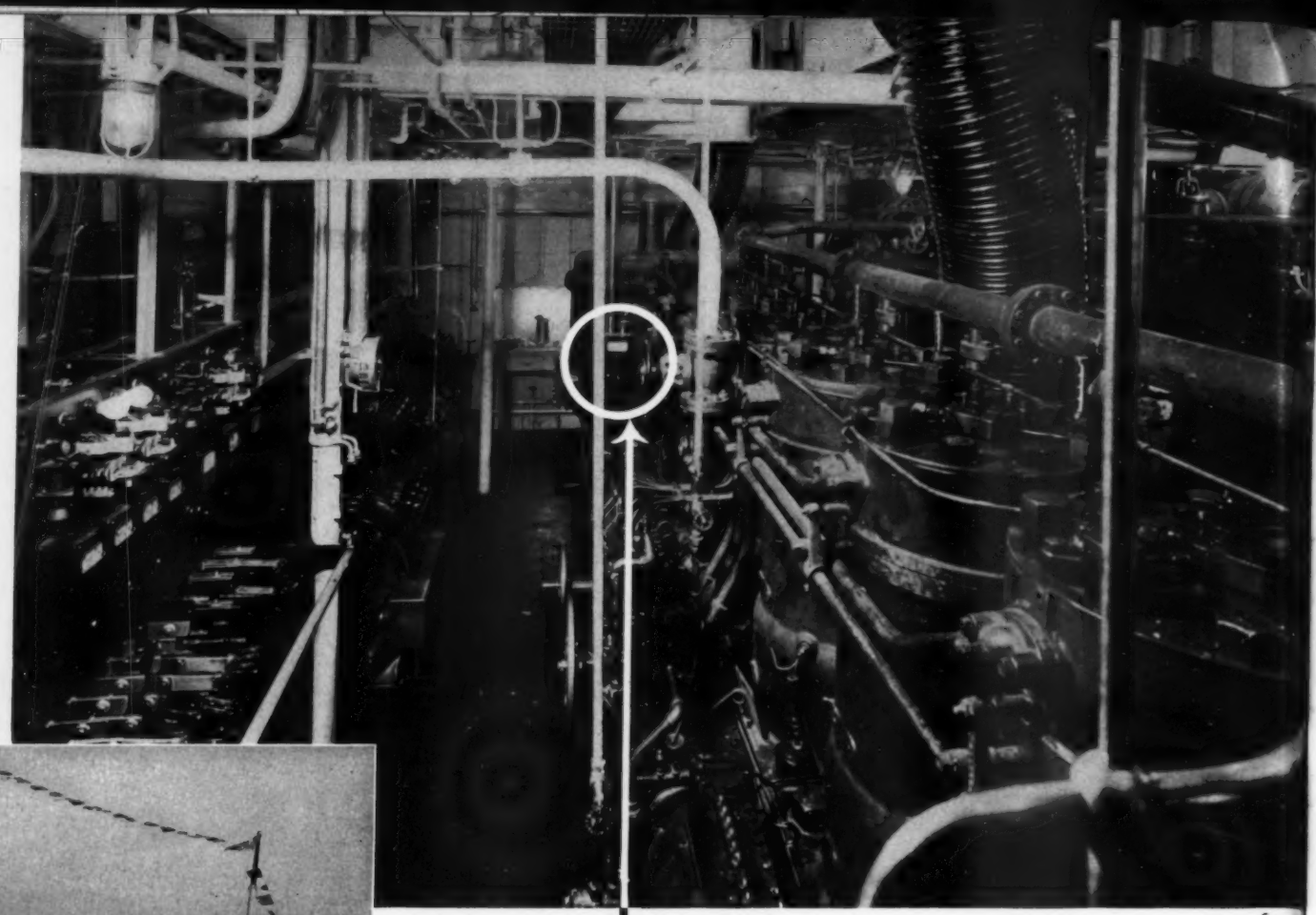


## MACMILLAN
## RING-FREE
## MOTOR OIL

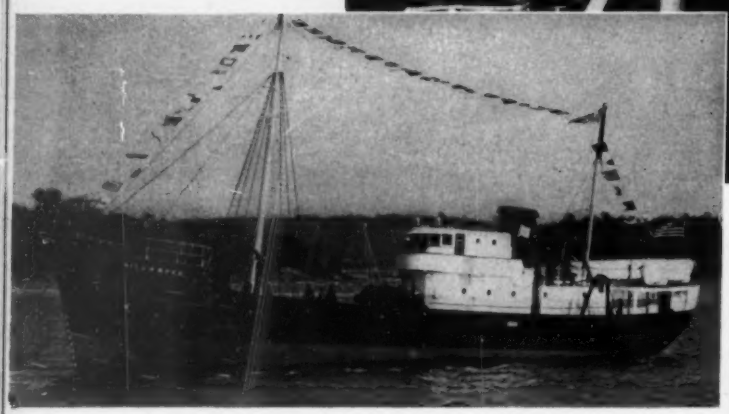
1. GREATER FILM STRENGTH
2. HIGHER HEAT RESISTANCE
3. LONGER CLING TO METAL
4. FASTER PENETRATION
5. REMOVES HARD CARBON
6. IS NOT CORROSIVE

Sold only in refinery-sealed containers • Never in bulk

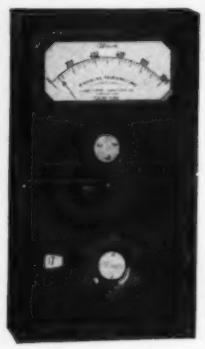
**MACMILLAN PETROLEUM CORPORATION**
**50 W. 50th Street, New York • 530 W. 6th Street, Los Angeles and El Dorado, Arkansas**



*General view of Engine Room showing the main propulsion Diesel which is a Model 37 Fairbanks-Morse, two-cycle, oil-cooled piston, solid fuel injection, direct reversible engine rated at 735 hp. at 260 rpm. The Alnor Rectangular Type Exhaust Pyrometer which protects this engine is clearly shown mounted on the engine.*



*Fishing Trawler "Villanova" owned by F. J. O,Hara Sons, Inc. Boston Fish Pier, Boston, Mass. Length 136' 4¼". Molded Beam 24'.*



*Close-up of Alnor Rectangular Pyrometer which serves the engine of "Villanova."*

# *First the Jeanne D'Arc then the Villanova*

THE Jeanne D'Arc, one of the finest and most modern fishing trawlers operating on the Atlantic seaboard, owned by F. J. O'Hara Sons, Inc., was launched August 21, 1937. It was designed for speed, dependability and maximum carrying capacity.

For the propulsion engine a Model 37-D, 2 cycle, Fairbanks, Morse marine Diesel engine was selected. To protect and to asssure maximum engine economy and dependability, an "Alnor" Rectangular Type Exhaust Pyrometer was chosen to serve it.

It is significant that when designing and building the "Villanova", the second trawler of the same type, that the "Alnor" Pyrometer was again selected.

"Alnor" Exhaust Pyrometers because of their ability to stand the rigors of the toughest marine service are to be found on a majority of modern vessels, not only trawlers, tuna clippers and other fishing vessels, but on freighters, tugs, yachts, dredges, in fact every type of Diesel powered craft.

When modernizing or building with Diesel power, it will pay you to insist that the engines be equipped with "Alnor" Exhaust Pyrometers.

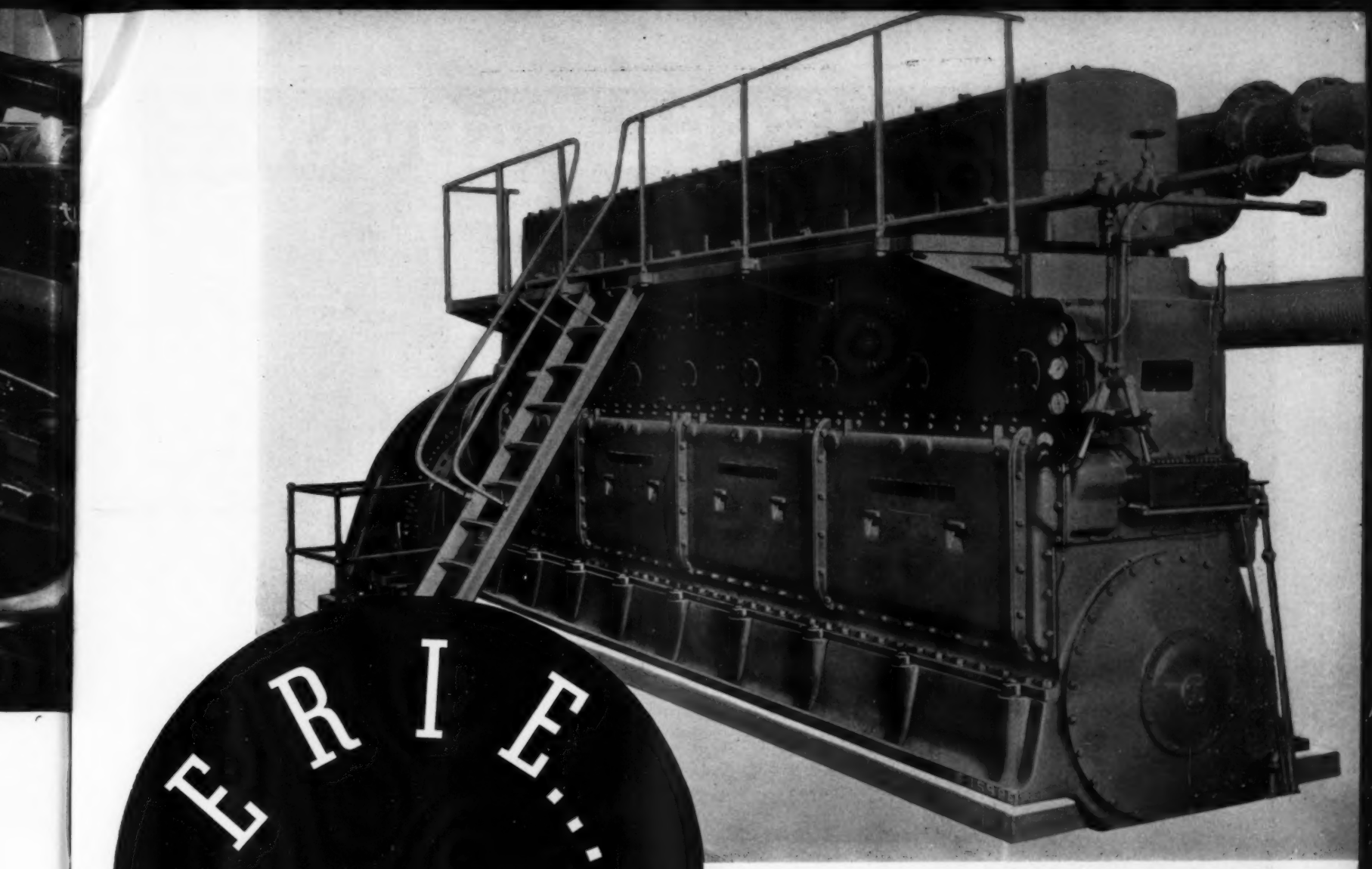
*Write for full information*

**ILLINOIS TESTING LABORATORIES, Inc.**

**423 North LaSalle Street • Chicago, Illinois**

*Testing Engineers and Manufacturers of "Alnor" and "Price" Pyrometers*
*The Products of 38 Years' Experience*

# "Alnor" Pyrometers—*The Engine X-Ray*



ERIE...

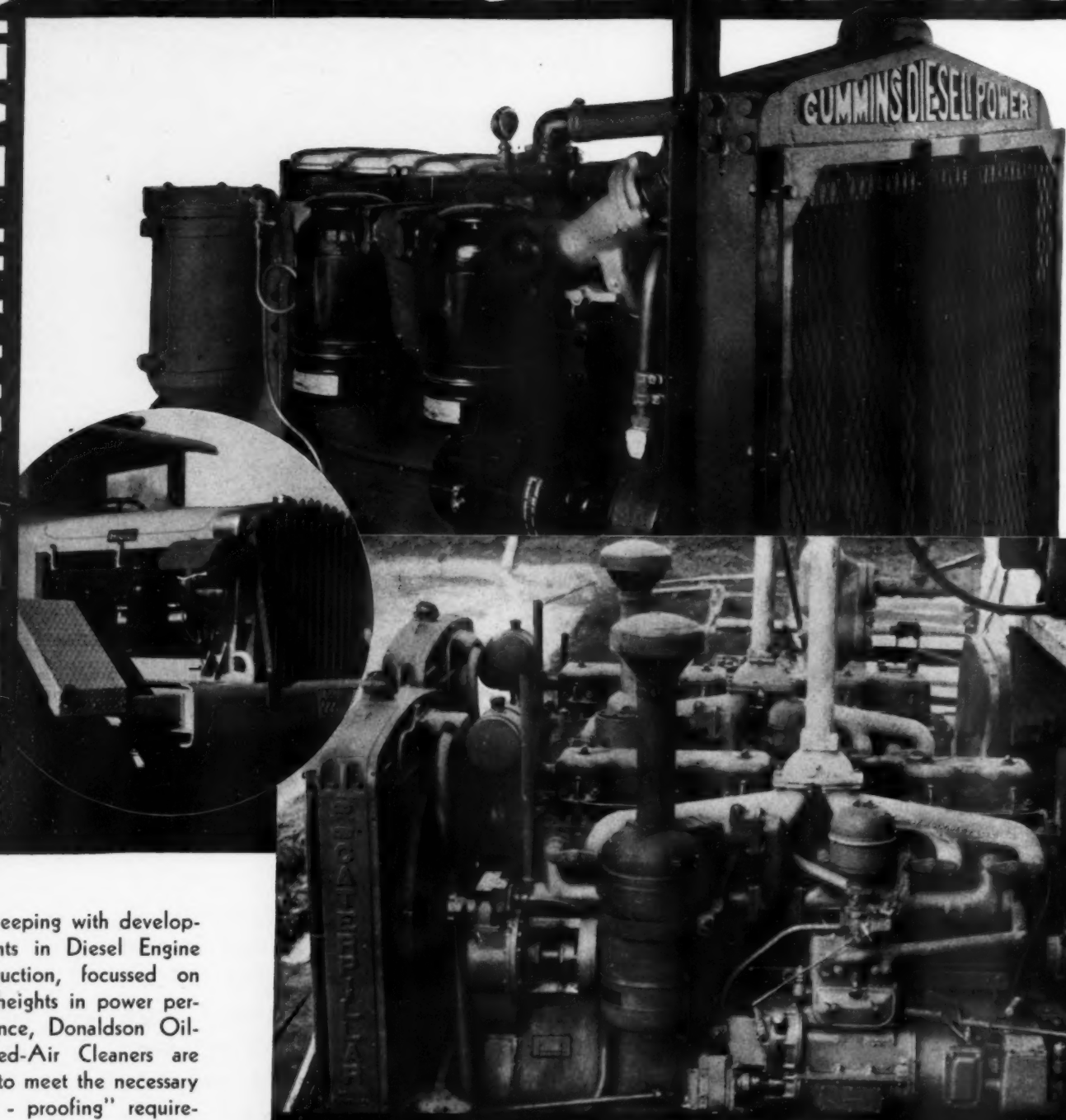
One of four 1000 hp. Worthington eight cylinder Diesel engines recently installed and now operating in a big mining operation in South Africa. All four crankshafts were manufactured and completely machined by Erie.

**This is another example of the confidence placed in the fine quality, accurate finish and durability of Erie Forge products. Leading engine builders rely upon our experience and complete facilities for the manufacture of crankshafts and other forged parts for all classes of stationary and marine engines.**

**Rough and finished connecting rods, piston rods, crossheads, generator and extension shafts and many other miscellaneous flat die forgings to the most exacting chemical and physical requirements.**

**ERIE FORGE COMPANY, ERIE, PENNSYLVANIA**

# IN STEP WITH EVERY NEW DIESEL ADVANCE




## DONALDSON "Oil-Washed-Air" CLEANERS

IN keeping with developments in Diesel Engine construction, focussed on new heights in power performance, Donaldson Oil-Washed-Air Cleaners are built to meet the necessary "dust - proofing" requirements. Donaldson Oil-Washed-Air Cleaners are unique in the ability to prevent dust from entering Diesel as well as gas engines. Because of this special ability they are standard equipment on leading makes of tractors, and automotive and industrial power units employing either Diesel or gasoline engines.

If your particular product needs dust protection, our engineers will be glad to submit a Donaldson Cleaner design to fit the job in hand. Feel free to consult us! ***See our exhibit at the Road Show.***



## DONALDSON COMPANY, INC.

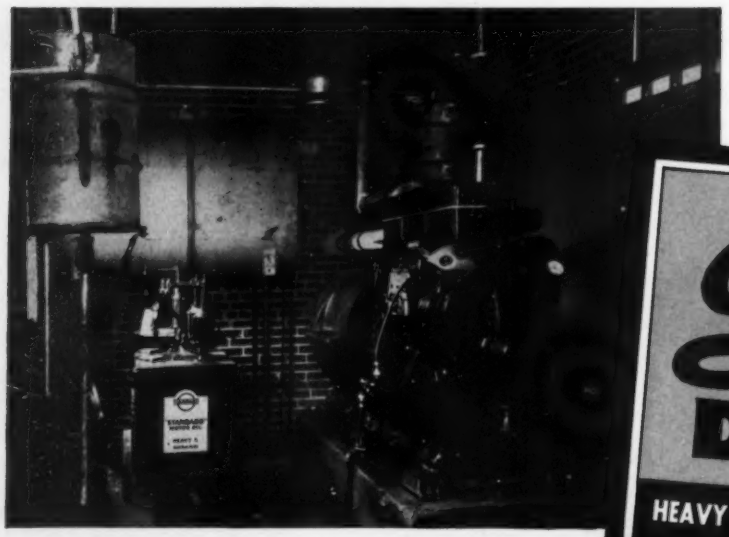
666 PELHAM STREET • ST. PAUL, MINNESOTA


Here's how STANDARD OIL COMPANY'S
NONPAREIL DIESEL OIL
cut Oil Costs on four large Diesels*
*Oil saving and carbon reduction were the result of a test recently conducted in a midwestern Utility Power Plant by the operator and a Standard Lubrication Engineer.
The test was made on a 6-cylinder, 16x20, two-cycle engine. The engine itself was first checked for mechanical defects. Faulty operation of the fuel injection pump was found to be causing some carbon formation in the ports. This was corrected and with Nonpareil in the engine, oil feeds were carefully adjusted.
At the end of the test period, oil consumption had dropped to less than a gallon of oil for 4000 H.P. hours.
The extra lubricating quality of Nonpareil permitted a safe reduction of the oil feeds on all four units in this plant. Carbon difficulties were practically eliminated.
A test of Nonpareil in your plant may show even greater savings. Let a Standard Lubrication Engineer help you. His service is free. Call him at your local Standard Oil office.
© 1938
STANDARD OIL COMPANY (INDIANA)
LUBRICATION ENGINEERING
THE RIGHT LUBRICANT • PROPERLY APPLIED • TO REDUCE COSTS

# POWER SAVINGS $1500 TO $1800



*Part of the 19 laundry machines operated by the Superior unit which also provides lighting current up to 5 KW.*



*Superior Model GA-6—50 KW, 220 volt, A. C. Diesel Electric Power Unit, installed by the Capital Laundry Company, Trenton, New Jersey.*

**Everywhere Superior Diesel Engines are switching dollars from the cost to the profit side of ledgers.**

**In Trenton, New Jersey, the operators of laundries have been quick to recognize the inherent economy and dependability of Superior Diesels.**

**A 40 KW Superior Generator Set installed by the American Laundry Company a year ago has turned in approximately $1500.00 in savings over the former cost of purchased power.**

**The Capital Laundry Company, after close observation of the American installation, installed a similar unit of 50 KW capacity and in three months time can credit approximately $475.00 to savings with over $1800.00 in sight for the year. Hundreds of similar installations in all types of service are showing comparable savings.**

**Superior Diesel Electric Power Units are available in sizes from 10 KW to over 600 KW. Surveys and proposals will be gladly furnished on request.**

**Superior DIESELS**

**HEAVY DUTY MODELS:**
50 to 810 H.P.,
250 to 720 R. P. M.

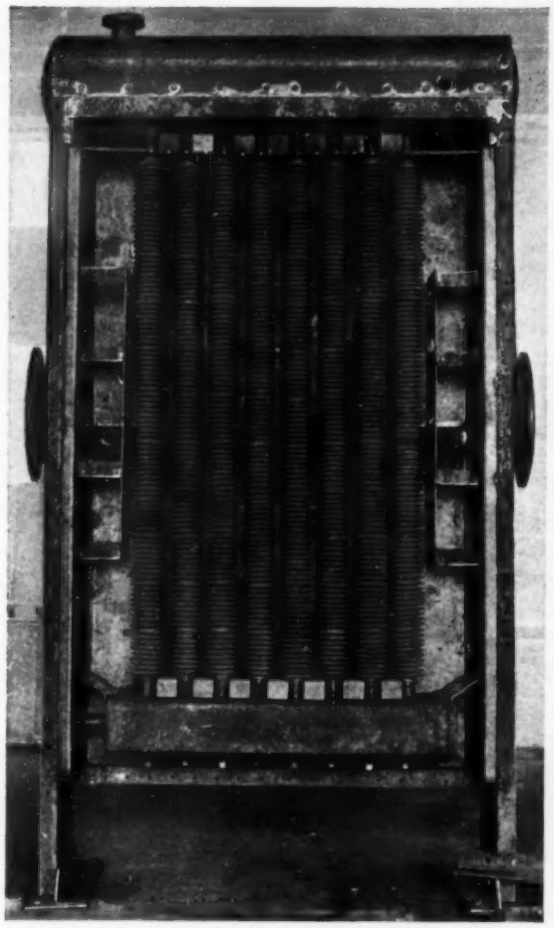
**HIGH SPEED MODELS:**
15 to 150 H.P.,
900 to 1800 R. P. M.

☆

## THE NATIONAL SUPPLY COMPANY . . . SUPERIOR ENGINE DIVISION

**FACTORIES:** Springfield, Ohio; Philadelphia, Pa. • **SALES OFFICES:** Springfield, Ohio; Philadelphia, Pa.; New York, N. Y.; Los Angeles, Calif.; Houston, Texas

# WASTE HEAT BOILERS AT FARMVILLE, NORTH CAROLINA



*The waste heat boilers at Farmville have 144 sq. ft. of heating surface arranged in the compact manner illustrated. Shop view shows a standard unit, made in sizes from 72 to 288 sq. ft., with air-tight metal casing removed from one side.*

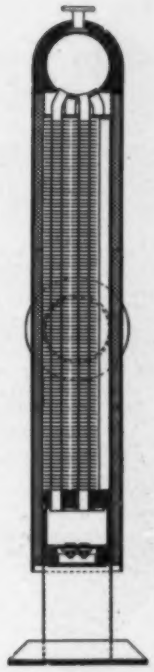
## Hold Pressure on Standby Boilers at no fuel cost

• **Farmville, Pitt County, North Carolina, now generates power in a new Diesel power station, relegating to standby service an existing steam plant found inadequate for present needs. Exhaust gases from the two McIntosh and Seymour Diesel engines pass through Foster Wheeler waste heat boilers and generate steam at 20 lb. pressure. This steam is put into the steam drum of the standby, direct-fired boiler to keep the feedwater heated.**

## Extended Surface multiplies heat absorbing area

• **Much of the efficiency of Foster Wheeler waste heat boilers is accounted for by the extended surface of cast iron gilled rings shrunk upon steel boiler tubes. High heat recovery from low temperature gases is provided and excellent muffling effected; space requirements are held to a minimum and pressure tubes permanently protected against the corrosive effect of hot gases by the cast iron armor. Steam may be generated at pressures to 150 lb. per sq. in., or water may be heated for boiler feed, process or domestic uses.**

• **The success of Foster Wheeler heat recovery equipment, in a hundred and thirty installations, merits the attention of operators desirous of reclaiming a profit from heat now going to waste.**



*Sectional view of the Farmville boiler showing close spacing of elements to obtain high gas velocities necessary for proper heat transfer.*

*Write for Bulletins*
*WHB 37-8*
*and*
*WHB 37-9*

**TABLE GIVING STEAM CAPACITIES**

| | POUNDS OF STEAM PER HOUR FULL LOAD | | | |
|---|---|---|---|---|
| | Pressure 5 lb. per sq. in. | | Pressure 15 lb. per sq. in. | |
| H.P. | 4-cycle | 2-cycle | 4-cycle | 2-cycle |
| 75 | 77 | 63 | 72 | 57 |
| 100 | 92 | 78 | 87 | 71 |
| 200 | 154 | 165 | 147 | 150 |
| 300 | 212 | 229 | 199 | 208 |
| 400 | 327 | 300 | 309 | 273 |
| 500 | 392 | 370 | 372 | 336 |
| 600 | 483 | 450 | 455 | 410 |
| 700 | 550 | 525 | 520 | 477 |
| 800 | 638 | 600 | 600 | 545 |
| 900 | 700 | 675 | 664 | 615 |
| 1000 | 780 | 750 | 735 | 682 |

FOSTER WHEELER CORPORATION
165 Broadway -:- -:- New York, N. Y.

FOSTER WHEELER

# · DIESEL FILTERS ·



*Model 400 Sentinel oil filter as installed on both marine and stationary Diesels of the B. Turecamo Contracting Company*




*TURECAMO BOYS, newest and largest of this famous tug boat fleet, powered with a 600-hp. Winton Diesel carrying a Number 10 and 20 model 400 Sentinel filter on the fuel and lubricating oil lines respectively*

## "ON LAND AND SEA" . . .

**SENTINEL FILTERS PROTECT TURECAMO DIESELS**

The B. Turecamo Contracting Company of Brooklyn, New York, believe thoroughly in the economy and dependability of Diesel engines for power, both in their well-known tug boat fleet and on shore in their power plant.

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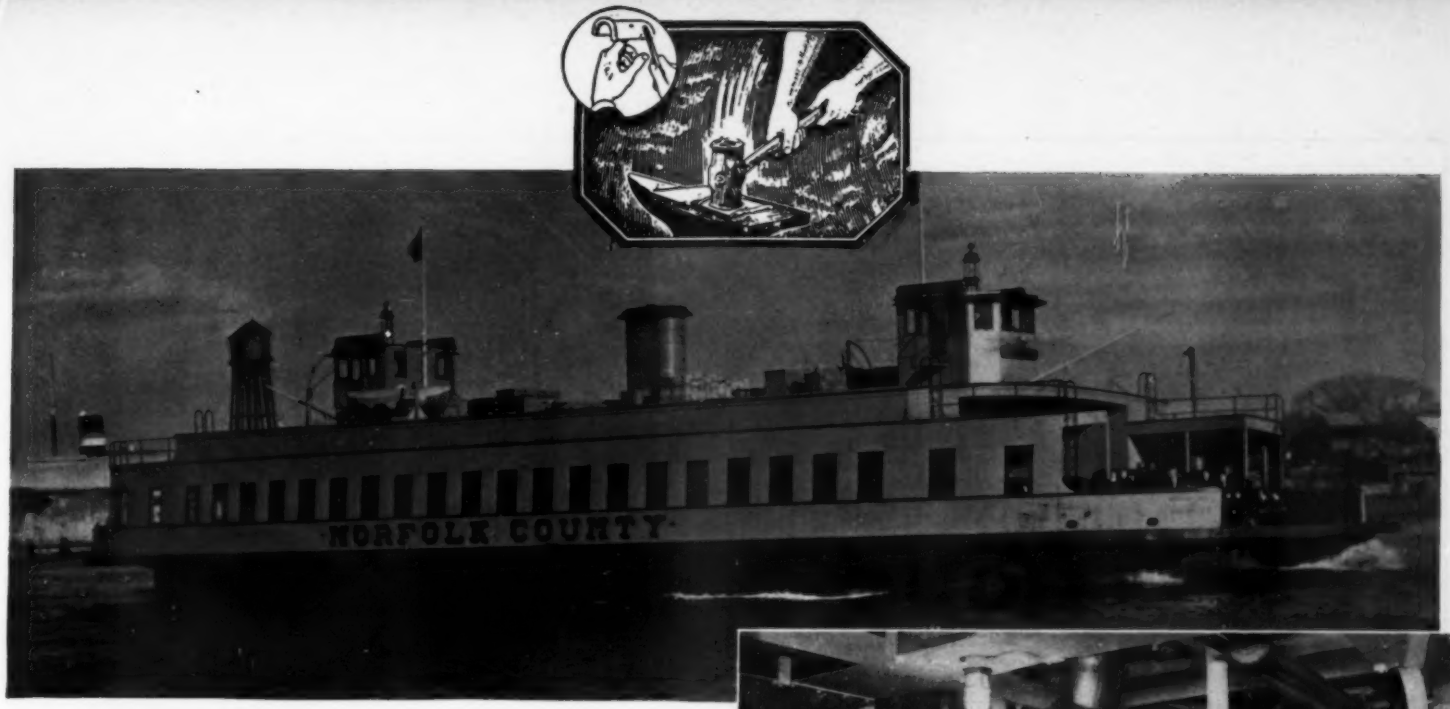
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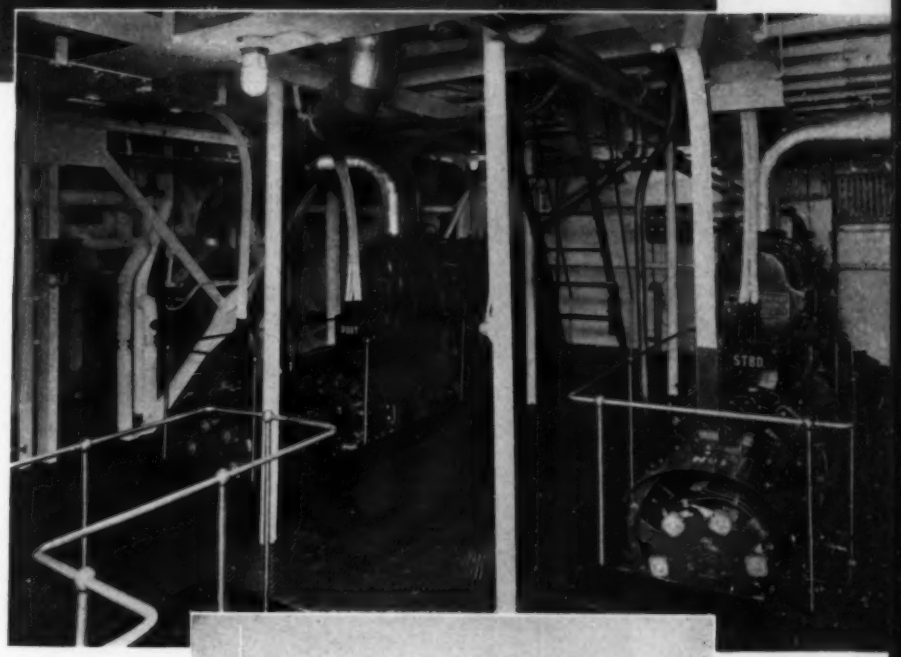
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*A patented alloy manufactured by National Lead Company. Trade-mark registered

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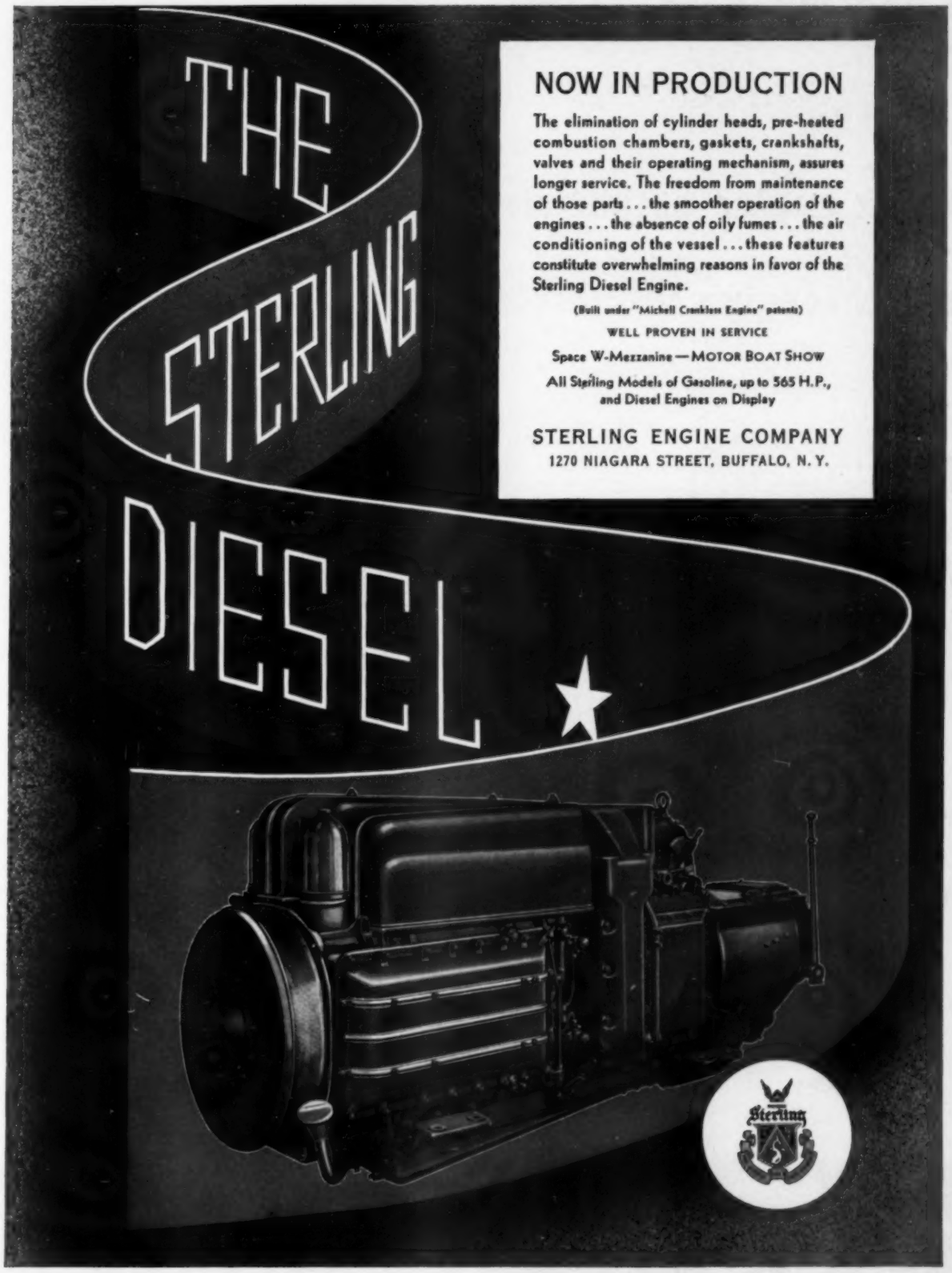
Diesel motor builders know they can rely on Bantam for performance. The basically sound design of Bantam Quill Bearings combined with outstanding quality, assures absolute satisfaction and long bearing life.

The BANTAM Wrist Pin Roller Bearing shown has contributed much to modern Diesel performance.

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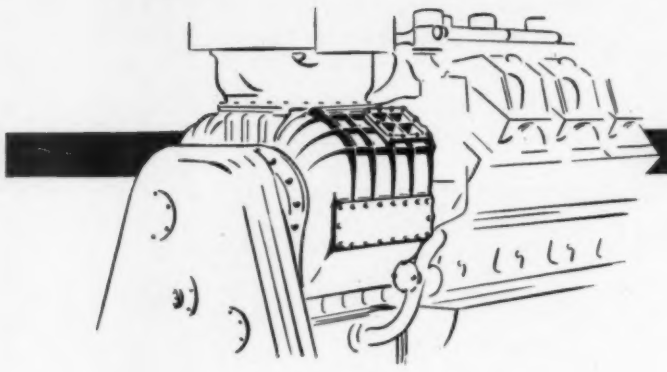

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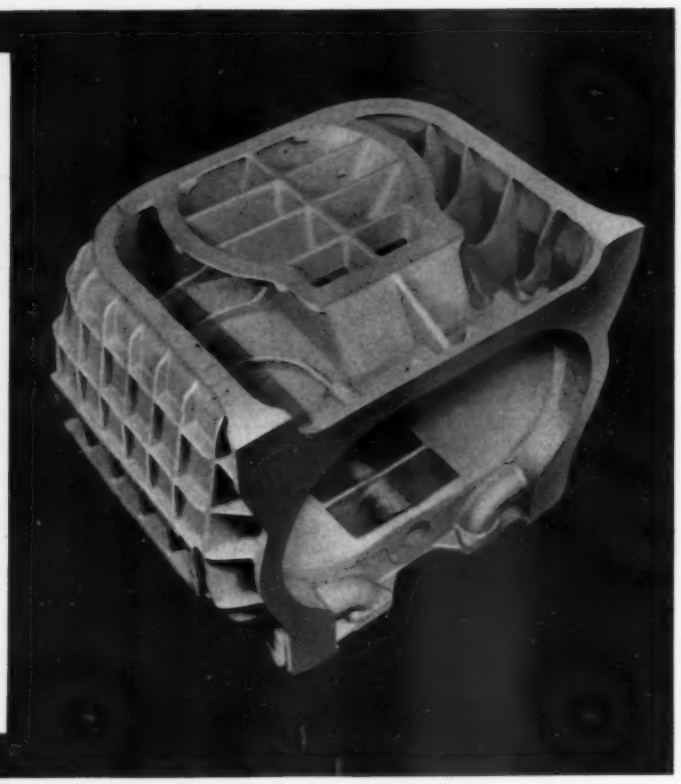
# ALUMINUM

## contributes

## to higher engine output via

## forced scavenging in Diesels





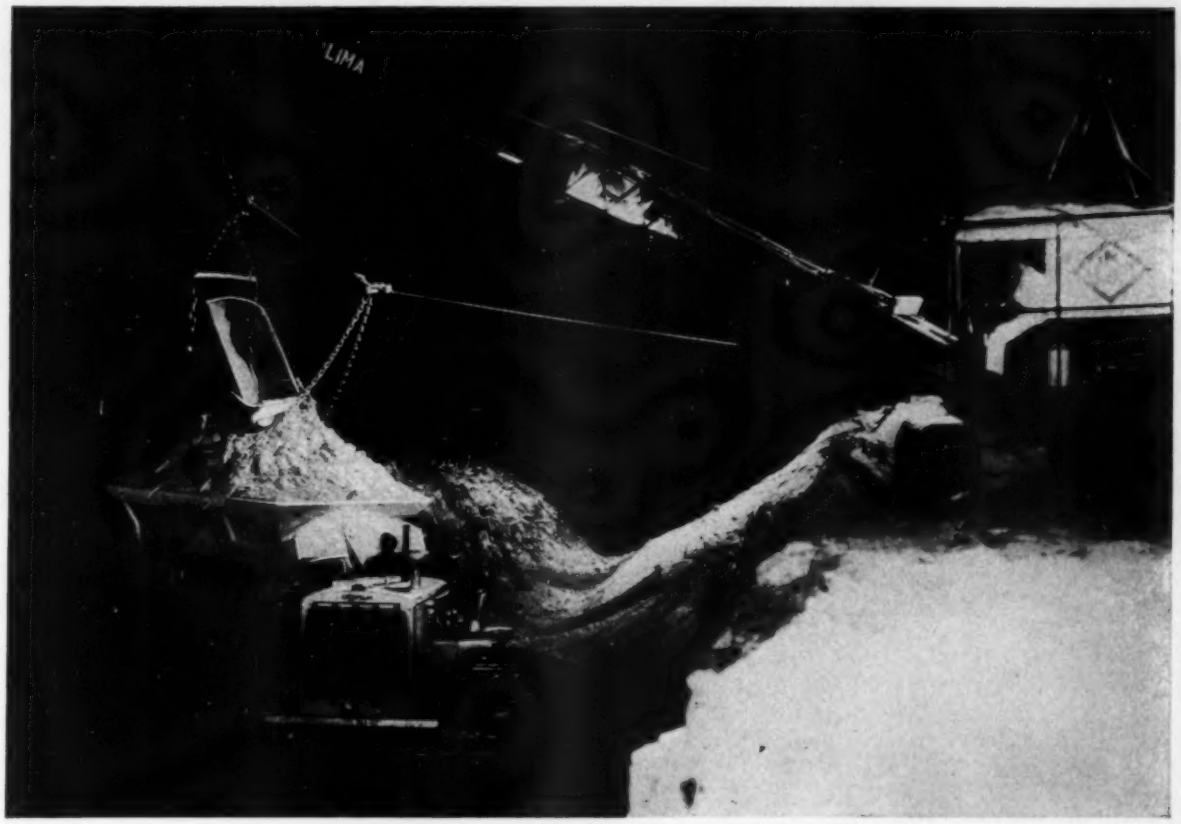
Supercharging — forced scavenging — greatly increases an engine's specific output, from the standpoint of both weight and size. To get the greatest advantage in efficiency and weight, scavenging blowers are, largely, made of Aluminum.

Why made of Aluminum? Heat is distributed throughout the mass more rapidly by Aluminum, and parts in contact with air being pumped run cooler. Air is delivered to the engine at a lower temperature, thereby improving the volumetric efficiency of the blower.

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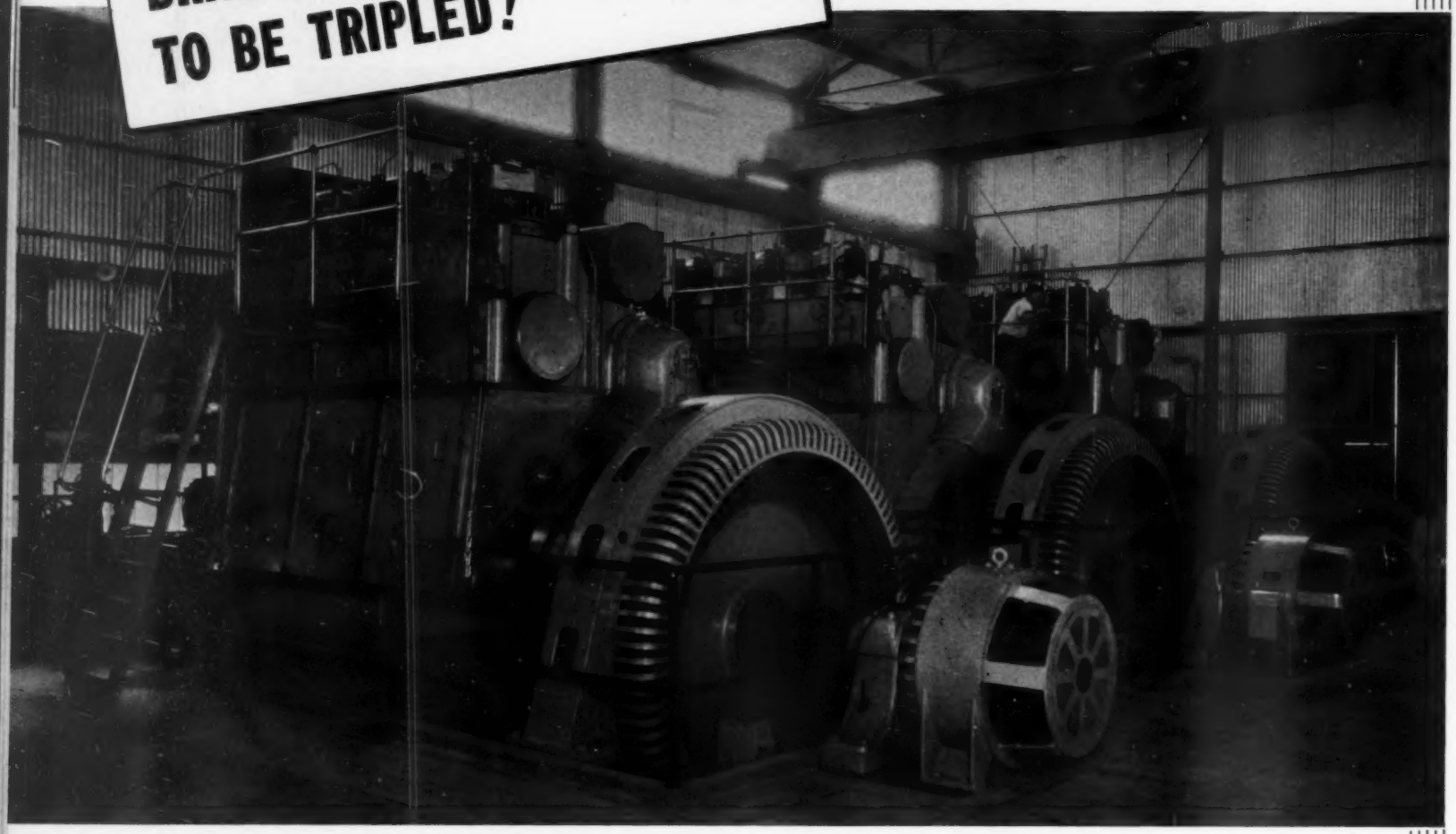
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# BRAWLEY DIESEL PLANT TO BE TRIPLED!



THE Imperial Irrigation District of California has purchased three new units for its Brawley plant. Each of which is twice the capacity of the units already installed.

The three original engines are three cylinder 21½" x 27½" HAMILTON-M.A.N. Diesel engines. The new engines will be six cylinder HAMILTON-M.A.N. Diesels, of the same cylinder size, direct connected to General Electric generators, with a net output of 1500 kw. each.

**HAMILTON - M. A. N.**
**GENERAL MACHINERY CORPORATION**
**Hooven, Owens, Rentschler Division**
**Hamilton, Ohio**

# BETTER, BECAUSE . . .



*Actual unretouched photographs of a sample of lubricating oil taken from the crankcase of a Diesel engine in service operation. The picture at the left shows the oil when drained from the crankcase—the right hand picture shows it after purification by the Youngstown Miller process. The pale effect in the cleaned oil is from the very intense light used in photographing. Actually it has the same characteristic color and body of its parent oil.*

**the Youngstown Miller Lubricating Oil Purifier in which the dirty oil was cleaned has removed *all* contaminants. Fuel Dilution—Acidity—Water—Sludges—Dirt—even tarry material and gums actually dissolved in the oil are out.**

**When oil returns to the engine, rid of gums which saturated it, it is capable of dissolving some of the old deposits, which are retained until the oil carries them out to the reclaimer for removal. Thus crankcases are cleaned and kept clean—friction is reduced and piston ring action improved through elimination of gelatinous and lacquer-like films. The inevitable result is less laboring under heavy loads, less lubricating oil makeup and nearly always noticeably less fuel consumption.**

**If you are using an oil cleaning equipment which is capable of removing only certain contaminants, or a portion of certain ones, it will profit you to investigate the Youngstown Miller Purifier. It is built in very small to very large sizes—all performing identically, and the results can be demonstrated in your own plant in very short time.**




**● The Illinois Central System, Chicago, Illinois, are users since June, 1935, and in reference to their Youngstown Miller stated on September 21, 1937:—**

"We are achieving excellent results in the reclamation of oils, not only for our Green Diamond, but for all our Diesel trains."

**OTHER USERS ARE QUOTED AS FOLLOWS:—**

**● Parke, Davis & Co., Detroit, Michigan, on November 8, 1937, wrote in reference to the Purifier:—**

"The engine has stopped pumping oil and deposits on everything in the crankcase have disappeared. The metal is clean and the quantity of lube oil used has materially lessened." In this installation there has also been a marked decrease in fuel consumption as indicated by the governor position.

**● Tipton, Indiana, Municipal Plant, stated December 2, 1937:—**

"Reclaiming the old oil which was in the engines when the Purifier was installed, the lubricating oil consumption has changed from 2,000 hp. hours to over 5,000 hp. hours per gallon. What's more, the fuel consumption has reduced from 1 gallon for 11 kwh. to 13 kwh. per gallon."

**● Elgin Butter Tub Co., Elgin, Illinois, on November 17, 1936, wrote:—**

"We value this equipment highly and it is our opinion no Diesel operator should be without it. When we first started using Diesel power we had an ordinary filter, later we had a cartridge type filter and from that went to a Centrifuge. None of this equipment gave us clean oil such as we are getting from the Miller Purifier."

**● Central Mills, Inc., Dunbridge, Ohio, Mr. Harold Harms, President:—**

"Entirely as a result of using your Oil Purifier, since no other change was made in procedure nor to the engine, excepting that we quit throwing away lubricating oil in crankcase lots, we reduced the makeup oil required by our engines from 3½ gallons per day to 1½ gallons. The crankcase insides are as clean as the day the engine was delivered. For the past three months we have been reclaiming old oil previously intended to discard, as our sole source of makeup oil."

"We would not think of running a Diesel engine without this equipment."

**● Renken Dairy Company, Brooklyn, N. Y.:—**

"Our Youngstown Miller Purifier is being used for reclaiming oil from our delivery trucks, our ice machines, and our Diesel engines. The reclaimed oil has been reused in the equipment from which it was taken, and whatever difference there is between the reclaimed oil and the new oil is distinctly in favor of the reclaimed oil. Our Diesels were purchased after the reclaimer had been installed so we have no experience in operating a Diesel without it."

THE YOUNGSTOWN MILLER CO.,
SANDUSKY, OHIO

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**☐AC ☐DC electric current.**
**Number and Make of Engines**
.....
**H.P. of Each Engine.....**
.....
**Gallons of oil in crankcase of all engines**
.....
**Quantity of other oils .....**
**Kind .....**

**Name .....**
**Address .....**
.....
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Buda—all types
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Coatalen—Aviation
Cooper-Bessemer—four types
Cummins—all types
Deschamps—Aviation
DeLaVergne—all types
Enterprise Engine
Fairbanks-Morse—five types
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Hall Scott
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Hill Diesel
Hooven, Owens, Rentschler
Ingersoll Rand—Type "S"
International Harvester Co.
Junkers—Aviation
Lister Diesel
Lorimer Diesel
Mercedes-Benz—Aviation
Murphy Diesel
Standard Diesel
Stover Diesel
Superior—Type "A"
Superior—Type "S"
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Weber—Horizontal
Western Diesel
Winton—Two cycle

Fifty-seven different models described and illustrated in color and full section.

# FIFTY-SEVEN DIESEL ENGINES

**Described in Detail by JOHN W. ANDERSON**
**Aviation Section by PAUL H. WILKINSON**

**320 Pages—10¼"x13½"—610 Illustrations, $3.00**

THIS new book on Diesel engines is entirely different from any other book previously published on the subject. In this new book fifty-seven Diesel engines are described in detail, illustrated in color and in full section.

John W. Anderson, author of the well-known book "Diesel Engines;" editor of "Diesel Application Planbook, Vol. One" and contributing editor to DIESEL PROGRESS, one of the most experienced and best known engineers in the Diesel industry, has described in intimate detail these fifty-seven Diesel engines. In this book he goes into the matter of individual design, discusses the features of design of each engine in clear cut, thoroughly understandable manner and makes it possible for the reader to grasp readily and quickly the differences between the various makes and types of engines now available on the market. He makes it possible to select from these fifty-seven different models the one engine fitted to the job in mind.

Beautifully illustrated in color, with sectional drawings vizualizing with complete clarity the design features of each engine, this new book brings you under one cover a marvellously clear picture of the engines now available. Right up to the minute, as modern as tomorrow, printed on a big page size (10¼" x 13½") to make the illustrations readable, this new book is indispensable to the Consulting Engineer, Diesel Salesman, prospective Diesel engine buyer—yet the price is but $3.00 postpaid.

In addition to the section of this new book devoted to engine descriptions, nearly 150 pages of additional material of vital interest to you will be found immediately following the engine articles — see chapter headings hereunder. Your particular attention is drawn to the "Birth of the Diesel Engine" chapter because here you will find how the Diesel engine started, who was Dr. Diesel, what happened to him —original data never previously published on his early trials and tribulations—an intensely interesting chapter.

The blueprint section of the book, following the style set by volume one of the DIESEL APPLICATION PLANBOOK last year, will be found worth the price of the book. Eighty odd pages of new plans, new applications, bringing you up-to-date with what has happened during the past year in applying Diesel engines to varying power problems.

We offer you this new book believing it to be the finest book of its type ever produced, authoritative, informative, beautifully printed and bound—a book you will be proud to own, a book from which you will obtain much useful information. May we hope you will use the coupon hereunder to-day—now.

## ADDITIONAL CHAPTER HEADINGS

(1) The Birth of the Diesel Engine
(2) Vibration Elimination
(3) Noise Elimination
(4) Flexible Connections
(5) Air Filtration
(6) Ponca City, Okla.
(7) Department Store Application Study
(8) Port Clinton, Ohio
(9) Sailors Snug Harbor
(10) Chicago Diesel Fire Boat
(11) 580 Fifth Ave., New York
(12) Mobile Ice Plant
(13) New York University
(14) Parke Davis Company
(15) Imperial Irrigation District
(16) LaPorte City, Iowa
(17) 8000 kw. Shanghai Plant
(18) 15,000 kw. Hydro Standby plant
(19) 22,000 hp. Mine installation
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(22) Paris, Texas, Observatory
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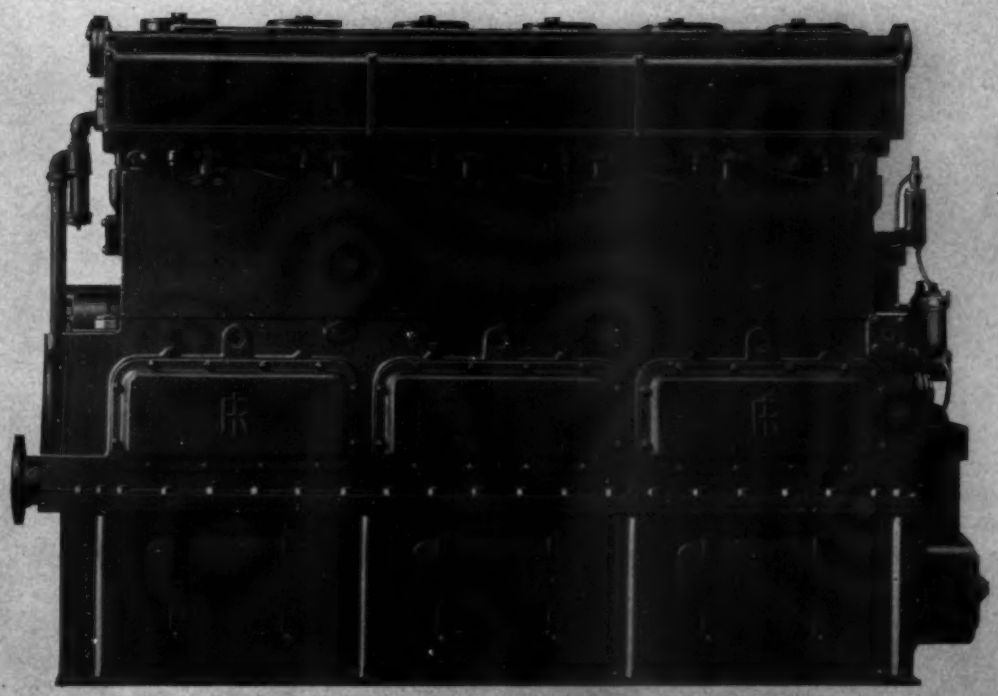
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# *Will you please read this letter- and if you have time, answer it?*

December 15, 1937

Gentlemen:

Last night a bunch of my fellow Diesel students were up in my room, and we naturally got to discussing the future of the Diesel Industry.

Charlie Banker, who worked five years in Australia, to get the money to go to school here in Los Angeles, raised the question as to the future for us fellows who are working hard to qualify for an opportunity in Diesel. Charlie has spent so much time and money and traveled so far to obtain his training that he seemed a little uneasy, and we could not blame him. The rest of the fellows, myself included, felt that we were wise in taking Diesel training, and were enthusiastic about the future of the industry.

However, to quiet Charlie's fears someone suggested that we write some personal letters to men in the Diesel business for information and advice. We decided to talk to Mr. Rosenkranz first, and he offered to put our letter in Diesel Progress and pay the bill himself.

There is really just one question we wish to ask: And that is, "Is there a future in the Diesel trade for mechanically inclined, clean cut young men, who are willing to spend their time and money getting a thorough fundamental knowledge of Diesel engines?"

We realize, of course, that we will have to start at the bottom, and add to our training, the necessary practical field experience. We are a serious bunch of fellows, working hard, and sacrificing time and money to obtain our training. And we would like to know how you men who have won high places in the Diesel field feel about us and our future chances for success in the industry.

We know that most of the men who read this magazine are very busy men. But we feel that somebody will answer this letter and give us good, honest advice.

To each of us, the above is an all important question, and we feel to obtain a satisfactory answer we must go to the men who know.

Very truly yours,

Harvey C. Meade,
c/o National Schools,
4000 So. Figueroa St.,
Los Angeles, California.

*This space in Diesel Progress is being paid for by NATIONAL SCHOOLS of Los Angeles where Harvey Meade is a regular student in the Diesel Division. This is not a regular National Schools Advertisement.




# JANUARY CONTENTS


| | PAGE |
|---|---|
| ELCO DIESEL CRUISERS | 26 |
| STANDARDIZED DIESEL CRUISERS | 28 |
| ANNUAL DIESEL STATISTICS | 29 |
| FARMVILLE, NORTH CAROLINA | 33 |
| LOG OF THE *BLUE SUNOCO* | 36 |
| ARTESIA ICE PLANT | 38 |
| LATEST IN STREAMLINED TRAINS | 40 |
| *JEANNE D'ARC* and *VILLANOVA* | 42 |
| DIESEL ENGINE No. 12 (STERLING) | 44 |
| NEEDHAM, MASSACHUSETTS | 46 |
| DIESEL TUGS, *DRAVO NOS. 41* AND *42* | 48 |
| *DANELL* AND *ESCAPE II* | 50 |
| DIESEL ENGINES No. 11 (SUPERIOR MODEL D) | 52 |


**REX W. WADMAN**
***Editor and Publisher***

FRONT COVER ILLUSTRATION – Original design by Jack Manley Rosé, noted marine artist, executed especially for DIESEL PROGRESS in keeping with the spirit of the National Motor Boat Show.

TABLE OF CONTENTS ILLUSTRATION – Allis-Chalmers "Model S-O" oil engine tractor, fitted with bulldozer, on road construction work at White Plains, New York.

DIESEL PROGRESS for January, 1938, Vol. IV, No. 1. Published monthly by Diesel Engines, Inc., 2 West 45th St., New York, N. Y. Tel. MUrray Hill 2-5092. Subscription rates: U. S. A. and Possessions $3.00 per year; 25c per copy. All other countries, $5.00 per year; 50c per copy.

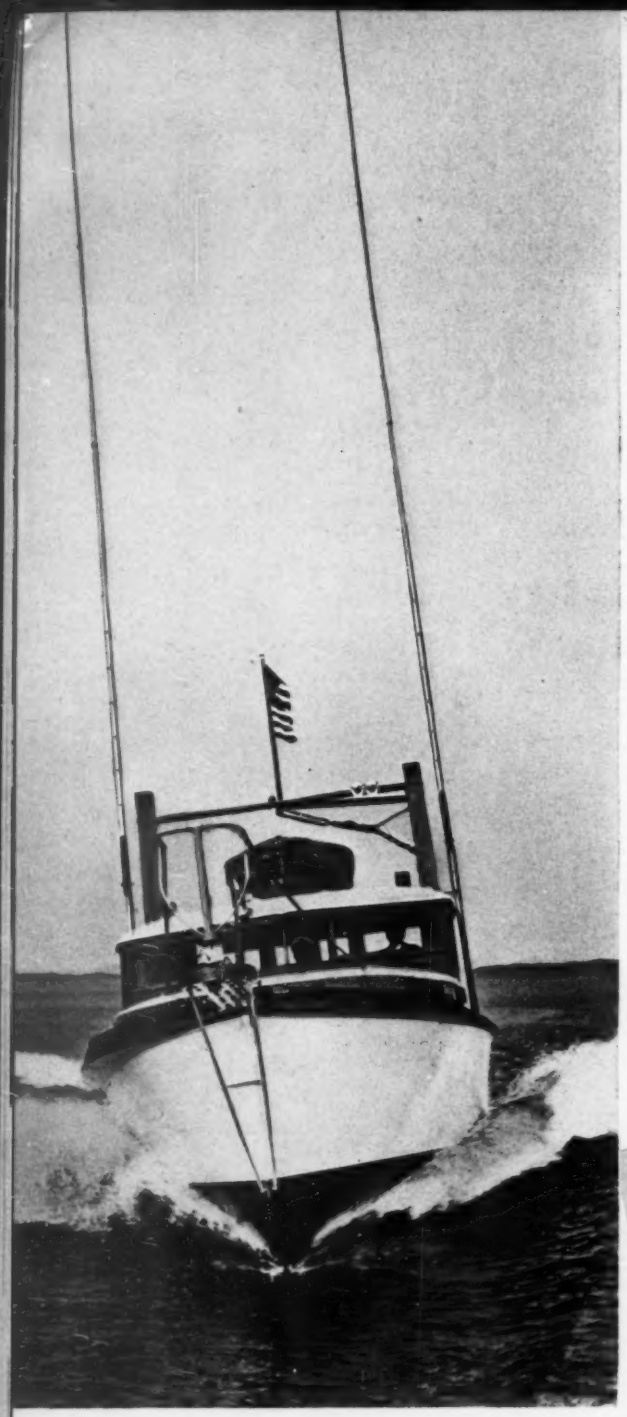
# ELCO DIESEL

DURING the past year the Elco Works have made interesting and important additions to the imposing roster of standardized Diesel cruisers. Of these many fine yachts, one which has not yet received editorial comment by DIESEL PROGRESS is the special 41-ft. Elco Angler, *Cantine,* which was recently delivered to Colonel Robert R. McCormick, Publisher of the Chicago *Tribune.*

Although a larger boat, *Cantine* bears a striking resemblance in outward appearance to Captain Tom Gifford's *Lady Grace.* In fact, the outriggers, vertical exhaust stacks and dual cockpit steering wheel and engine controls were patterned very closely after those of the famous fishing guide's boat. Likewise, both of these Elcos are powered with twin Buda Diesels supported by special, patented rubber mountings. Due to her greater size, *Cantine* carries Type 468 Buda Diesels, which develop 110 hp. each and are directly connected to the propellers. Four hundred gallons of fuel are sufficient for approximately six hundred and fifty miles of cruising.

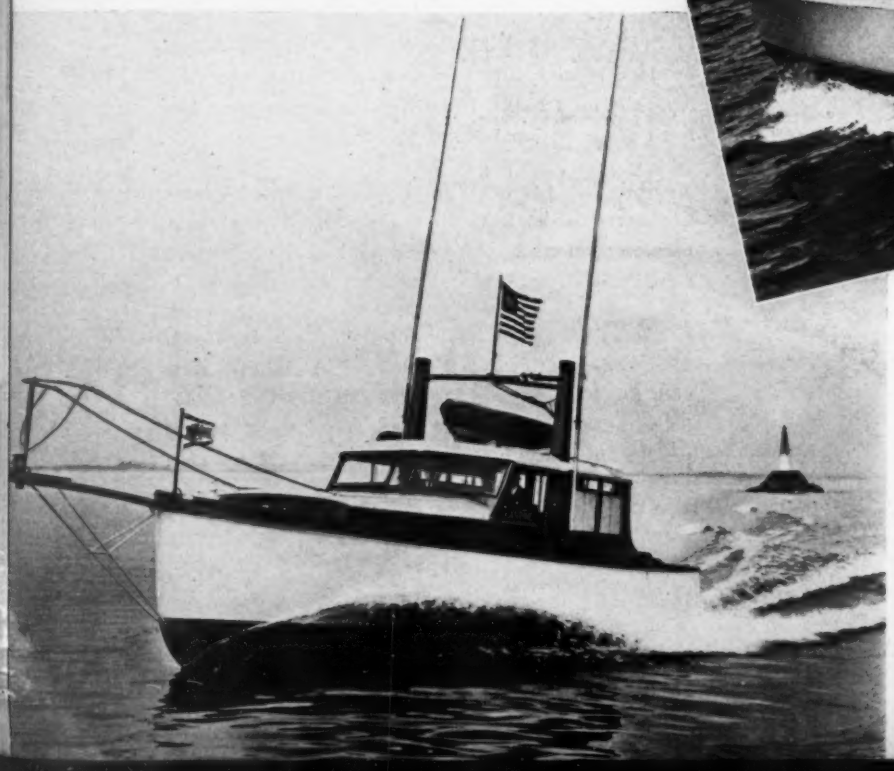
*Cantine's* hull measures 41 ft. in length by 11 ft. 9 in. beam and has a draft of 2 ft. 10 in. Interior headroom has been increased to 6 ft. 6 in. to accommodate Colonel McCormick, who stands above average height.

Sleeping accommodations for four persons are furnished by two berths in the deck cabin im-



*The two views of the "Cantine" on the left show clearly the outboard changes which differentiate her from the standard Elco 38 illustrated below. In addition, "Cantine" is three feet longer.*





*Bird's-eye view of the new Elco sales and service office in Miami. The causeway between Miami and Miami Beach appears at the right.*

# CRUISERS

mediately forward of the cockpit and two in the bow cabin forward of the lavatory and galley. A pair of Elco swivel fishing chairs are fitted at the stern facing a roller to facilitate landing the larger catches. A fish-well open to the sea, bait boxes and harpoon pulpit complete the special built-in fishing equipment. The vessel is capable of 17 miles per hour speed and will be used at Palm Beach during the winter season, returning to Montauk Point, Long Island, in the spring.

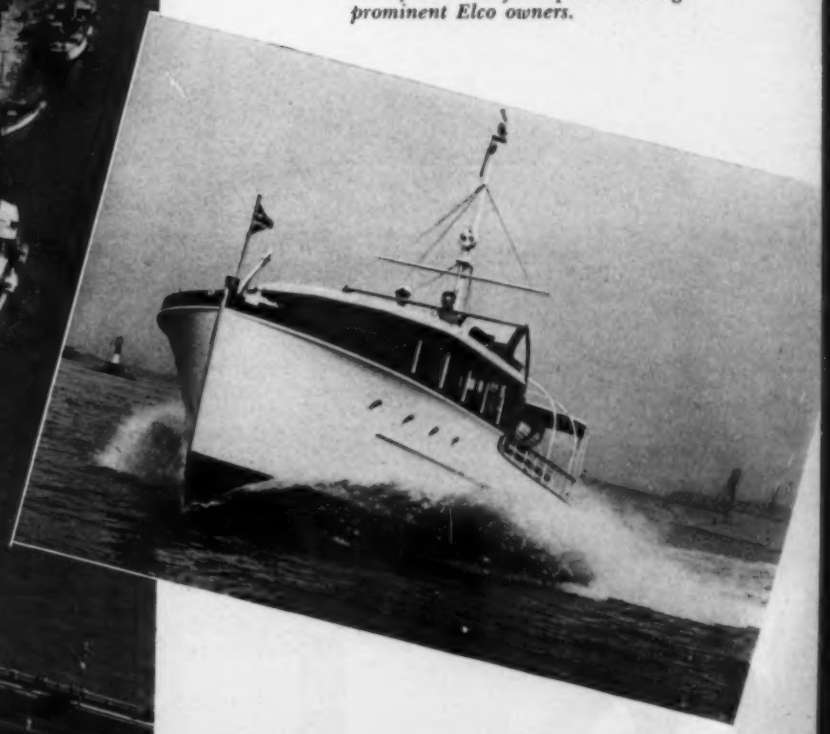
Of particular interest is the fact that these two Buda Diesels are not Colonel McCormick's first introduction to this type of power. His newspaper, the Chicago *Tribune*, operates large Diesel freighters to transport newsprint, and it is only logical to conclude that the success of these units affected materially his decision to install the smaller but no less dependable and economical engines in the *Cantine*.

In addition to the new Diesel cruisers produced by Elco during 1937, there is another important contribution to yachting recently announced by this organization which is worthy of note. For those fortunate enough to "follow the sun" this winter, a new Port Elco of Florida has been established. This is a factory branch sales and service office with complete docking facilities. For its Miami branch Elco has secured one of the best known and most convenient yachting sites in the city. Elco Cruisers, Inc., is located at Howard Bond's Dock, on the main causeway between Miami and Miami Beach. It is under the personal direction of a factory representative whose services are available to all Elco owners in Florida waters. Also a wide selection of the 1938 Elco cruiser models will be on display there.

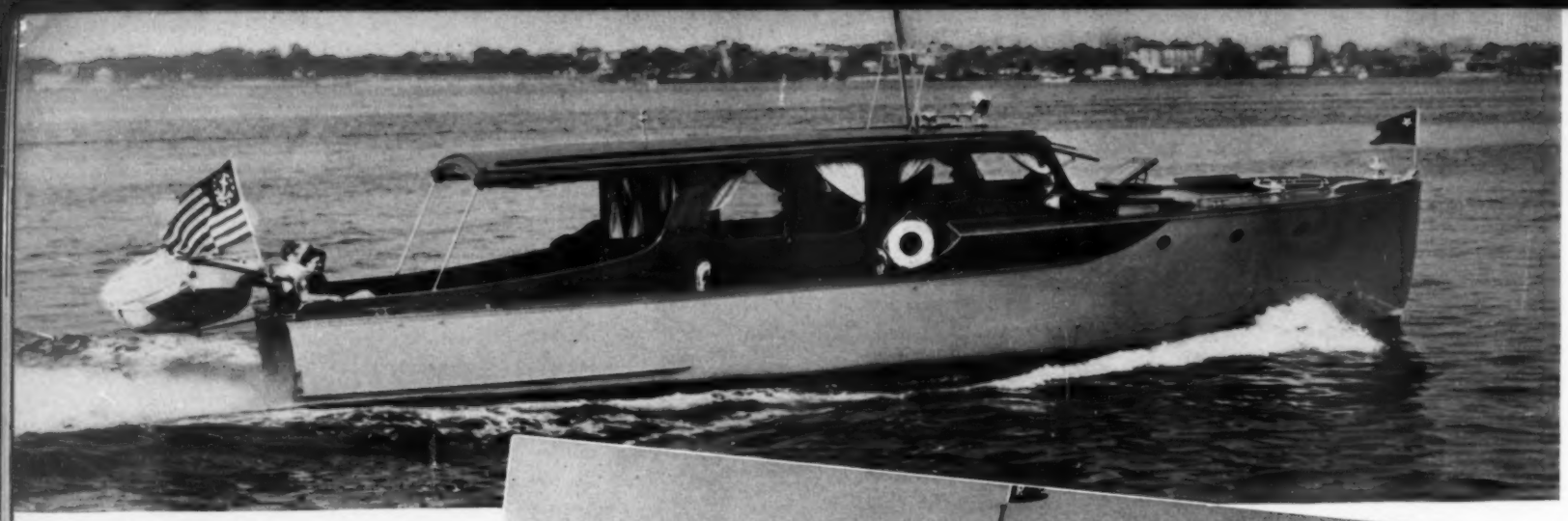
What might be termed "the flagship of the Elco fleet" is the luxurious 53 ft. cruiser also illustrated. Fitted with twin Diesel engines, this trim yet spacious vessel proudly takes her place among the finest of standardized cruisers. For yachtsmen who desire a safe, comfortable home afloat this combination is especially suitable. The size and construction of the boat naturally fit her to go anywhere, while the safety and economy of Diesels guarantee carefree hours or days of extended cruising. Regardless of whether your yachting requirements call for one of these large craft with maximum accommodations for extended cruising with a number of guests or whether you prefer a smaller "day cruiser" for off-shore fishing, there is an Elco to meet your most exacting specifications. There are also dependable and economical Diesel engines available to power it in the modern manner.



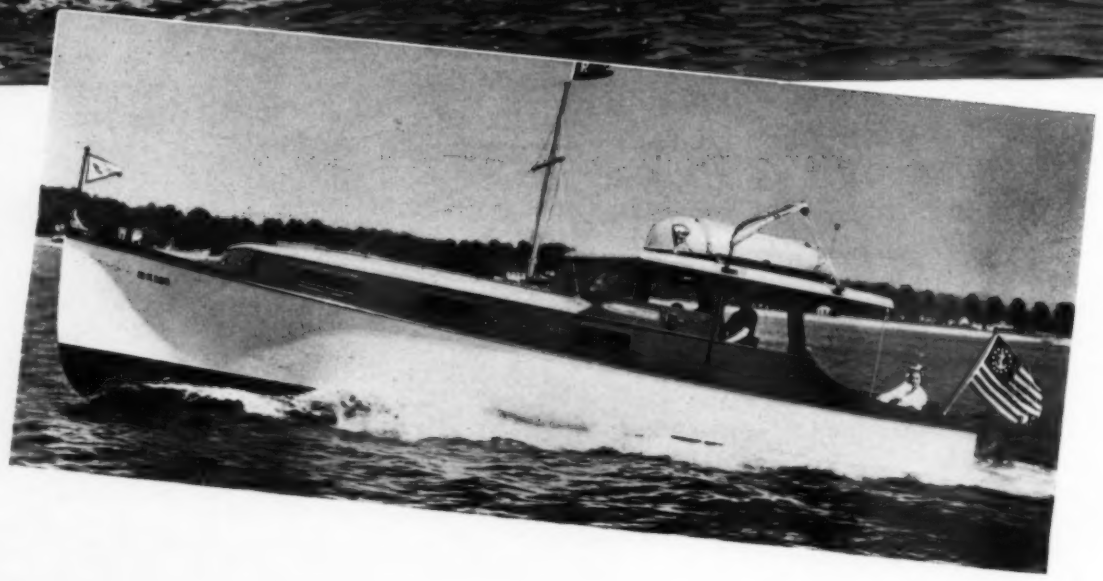




*Elco 53 in action. Diesel engines have found ready acceptance among prominent Elco owners.*



*"Nautigal," Wheeler 42' lounging sedan powered with twin Buda 110 hp. Diesel engines. Within a few days of this vessel's launching she left under her own power for Meenah, Wisconsin, the home of her owner, Mr. F. B. Whiting. This run of approximately 1,500 miles was made in less than two weeks, the fuel consumption averaging about three gallons per engine per hour.*



*Consolidated 39' cruiser similar to the "Mary-Eleanor" recently delivered to Mr. Robert Goelet of New York City. Two 110 hp. Buda Diesels equipped with Bendix remote controls, provide a speed of 19 mph. There are comfortable living accommodations for four people for extended cruising.*

# STANDARDIZED DIESEL CRUISERS

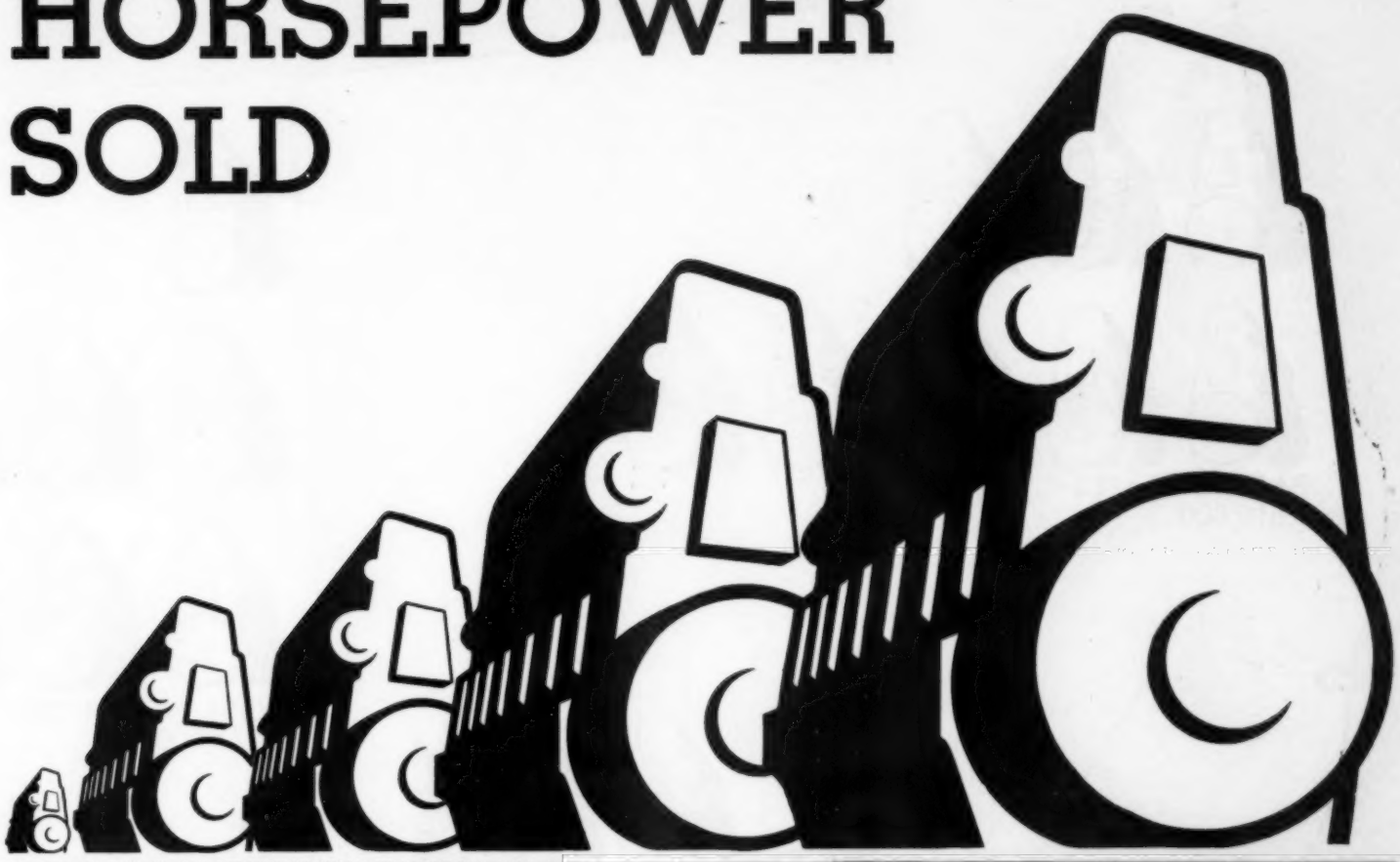


*Left — The Matthews 50' sport sedan cruiser, "Mañana II." Her owner, a prominent Detroit yachtsman, selected a pair of 100 hp. Superior Diesels for this combination cruiser and fishing boat.*

*A pair of 100 hp. Superior Diesels were likewise selected by Mr. O. M. Crotty of Cleveland for his 40' enclosed bridge Chris-Craft cruiser shown at right.*



# DIESEL HORSEPOWER SOLD



280,000 1933

750,000 1934

1,250,000 1935

1,900,000 1936

2,850,000 1937

FROM two hundred and eighty thousand horsepower production five years ago to two million, eight hundred and fifty thousand horsepower in 1937 is rapid growth, but this is a young industry, vibrant, sturdy, just beginning to make a mark for itself in the general power field.

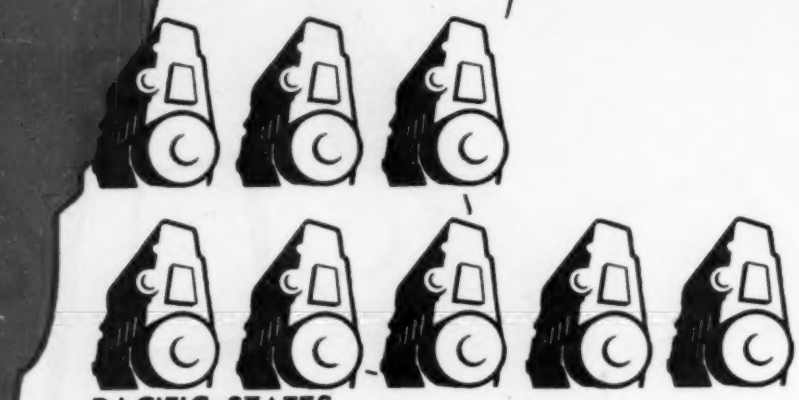
1937 was a good year for the Diesel industry, new fields were conquered, many new applications developed. Technical advances were many. All in all 1937 can be looked back upon with a glow of satisfaction, with a feeling of having ventured much and gained much.

Going into 1938, the Diesel Industry is optimistic, full of confidence—its chin up, alert, youthfully active, straining at the leash to create new records and conquer new fields of application.

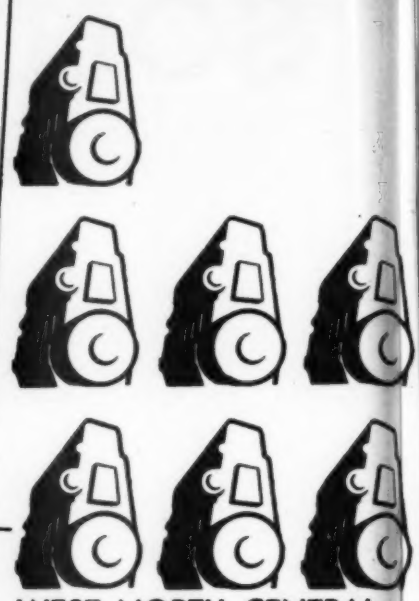
Permission is gladly extended for the reproduction, in part or in whole, of the statistics appearing on this and the three following pages. All we ask is that full credit be given to DIESEL PROGRESS, the Diesel Industry's statistical authority.

# DIESEL HORSEPOWER IN S

UP TO JAN A



PACIFIC STATES
1,619,000



WEST NORTH CENTRAL
2,175,000



MOUNTAIN STATES
708,700



WEST SOUTH CENTRAL
2,569,000

Each symbol represents 200,000 horsepower

NAVY, COAST GUARD AND EXPORTS EXCLUDED.

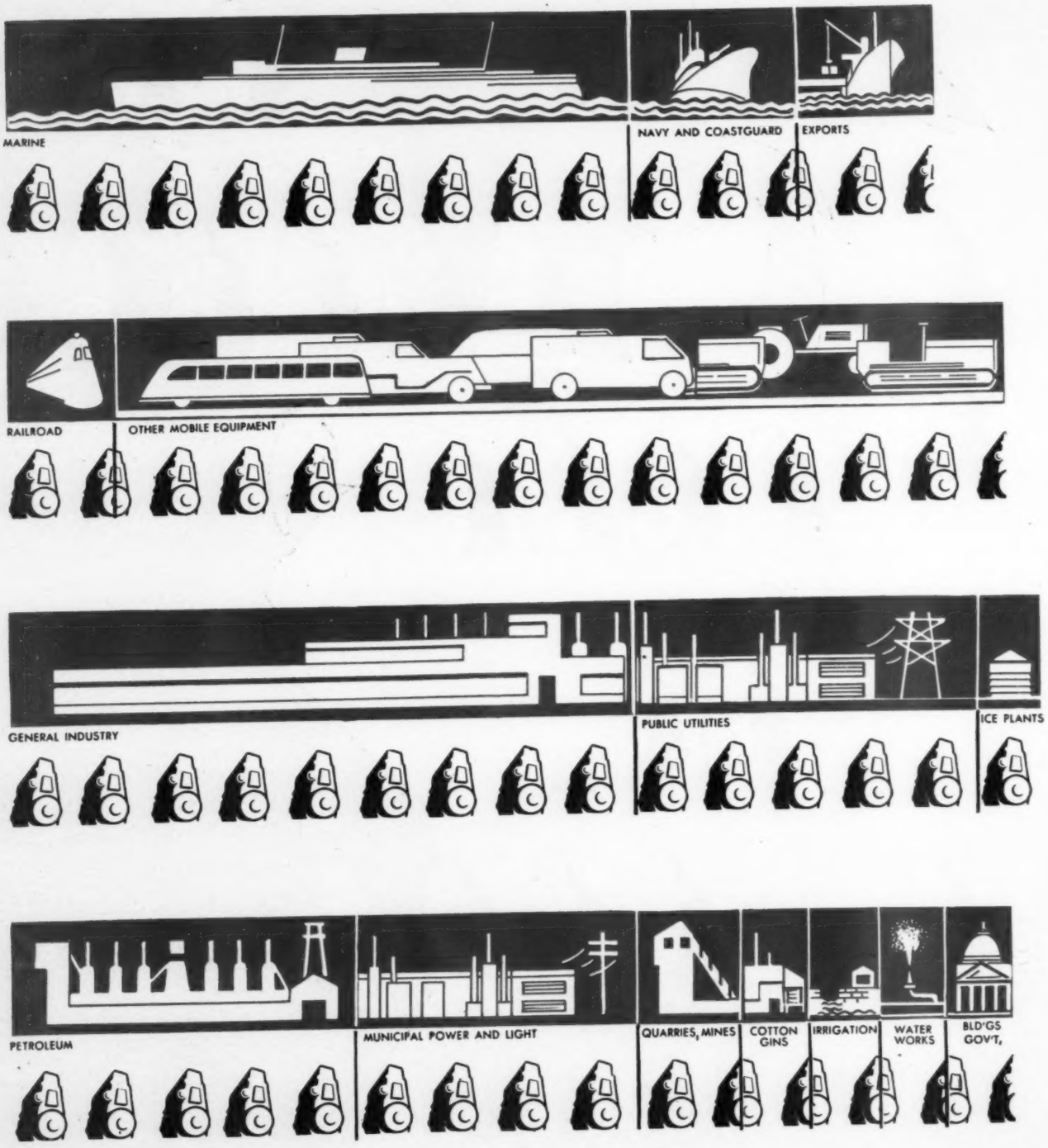
# INSTALLED IN THE U. S. A.

JANUARY, 1938



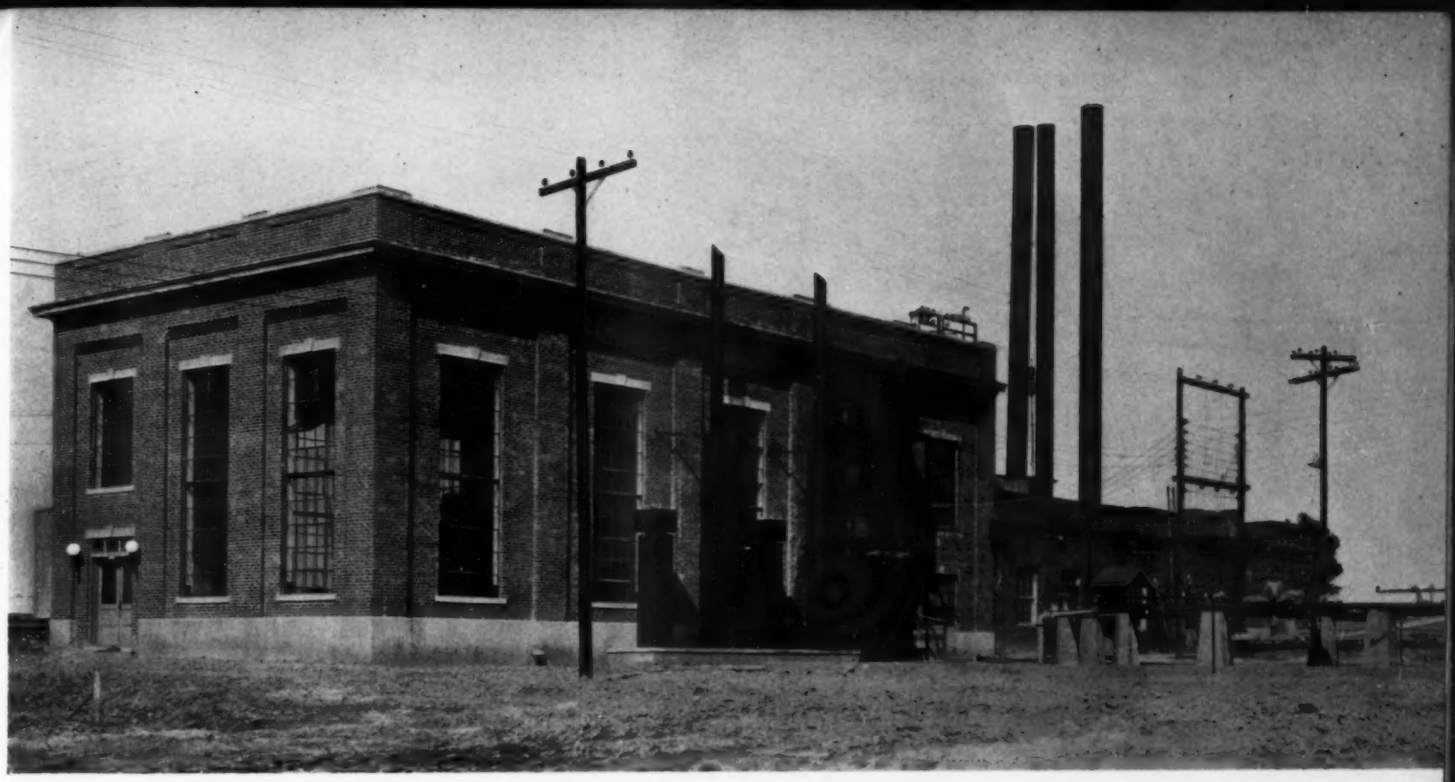

PICTORIAL STATISTICS, INC.

# USAGE OF INSTALLED DIESEL HORSEPOWER




Each symbol represents 200,000 horsepower

PICTORIAL STATISTICS, INC



*Exterior view of Farmville's Diesel plant. Maxim silencers and American air filters appear prominently in center foreground.*

# FARMVILLE, NORTH CAROLINA

### *Diesel Power Plant with Steam Standby*

*SOUTHERN Power Journal* tells in its December issue the very interesting story of the Diesel power plant with steam standby at Farmville. The new Diesel plant has been adapted to an existing power installation with the usual resulting drop in cost of generating the power.

This town of Farmville is well named because it is located in the midst of a rich cotton and tobacco farming district in Pitt County in northeastern North Carolina. The municipally owned light plant supplies light and power not only to the 2,500 population of Farmville, but also to the adjoining town of Fountain with a population of 400. At present the operation includes some 20 miles of rural lines and a contract has just been let for 60 miles additional.

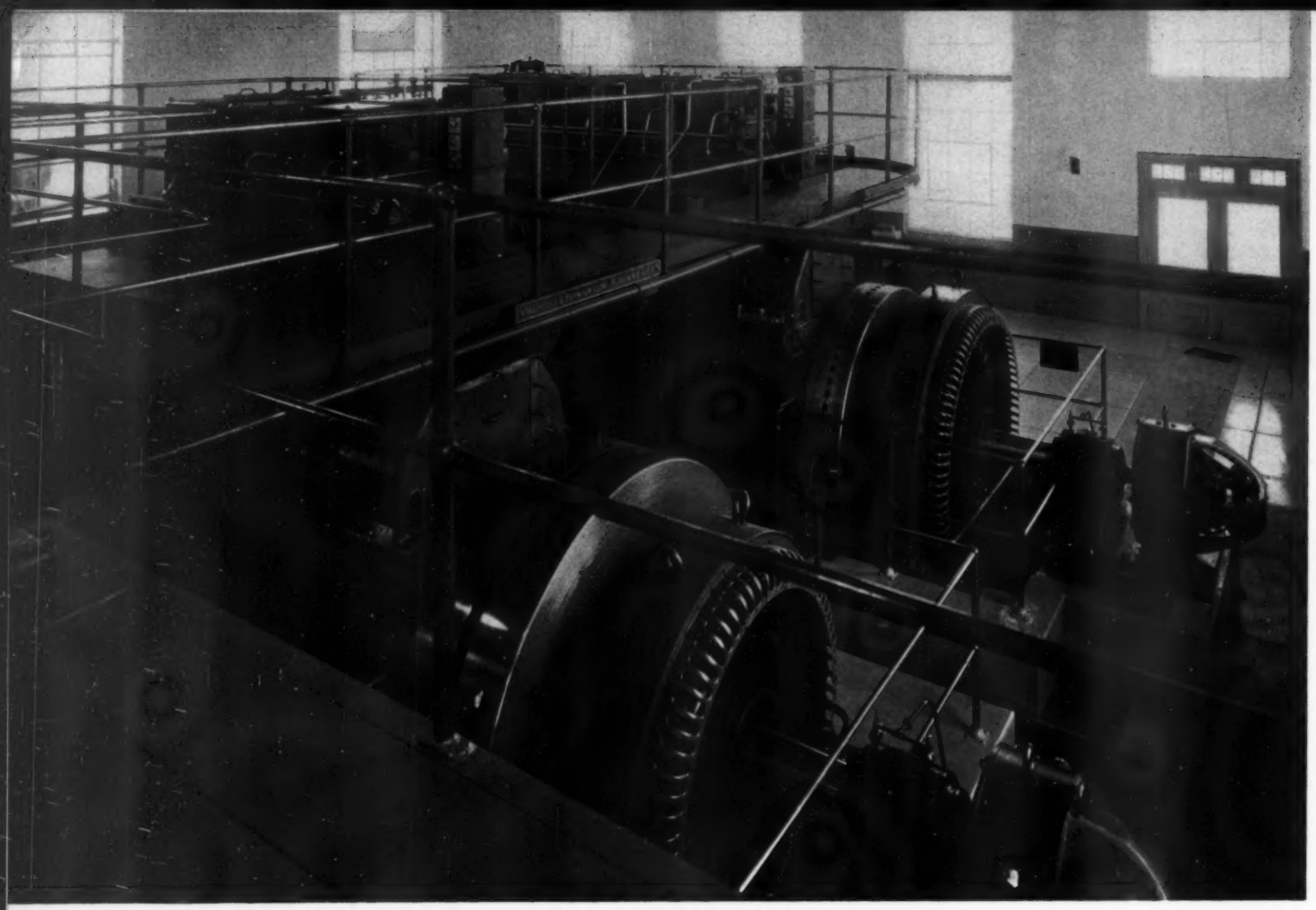
Electric service since its inception has been from an isolated municipally owned plant. Until early in 1937, steam power has been used. An increasing load necessitated consideration of additional capacity, and the Diesel plant was adopted in order to improve the operating economy. But this brought the problem of adequate standby capacity with a minimum capital investment. Since the old steam equipment was still in serviceable condition, it was decided to use the new Diesel installation for the regular generation of power and arrange the steam equipment so that it could be cut in on the line at short notice when required. The method worked out by the engineers has proved very effective and is quite simple.

The method and its details will be better understood if the Diesel plant is considered first. As shown by the general view of the plant, an entirely new Diesel plant was built alongside of and attached to the existing steam plant. Very few changes were made in the steam installation except to interconnect it with the new Diesel plant.

Two McIntosh & Seymour (Alco) four cycle Diesels were installed of 430 hp. and 750 hp. capacity, respectively. The former has three cylinders and the latter five cylinders of the same size, 17½" by 25". Running at a speed of 257 rpm., these engines are direct connected to Westinghouse alternators of 300 kw. and 500 kw. capacity, respectively. Exciters are direct connected and driven by an extension of the generator shaft. Current is generated at 60 cycles, 3 phase and 2,400 volts.

The Diesels are standard units, completely described in the DIESEL ENGINE CATALOG, Vol. 2, beginning on page 117, and need no description here, except to state that the engines are fitted with Woodward Type IC governors and with Bosch fuel injection equipment.

The intake air is taken from outside through the American air filters set on top of the Maxim silencers placed outside next to the



*General engine room view from the gallery which gives access to the cylinder heads and Woodward governors.*

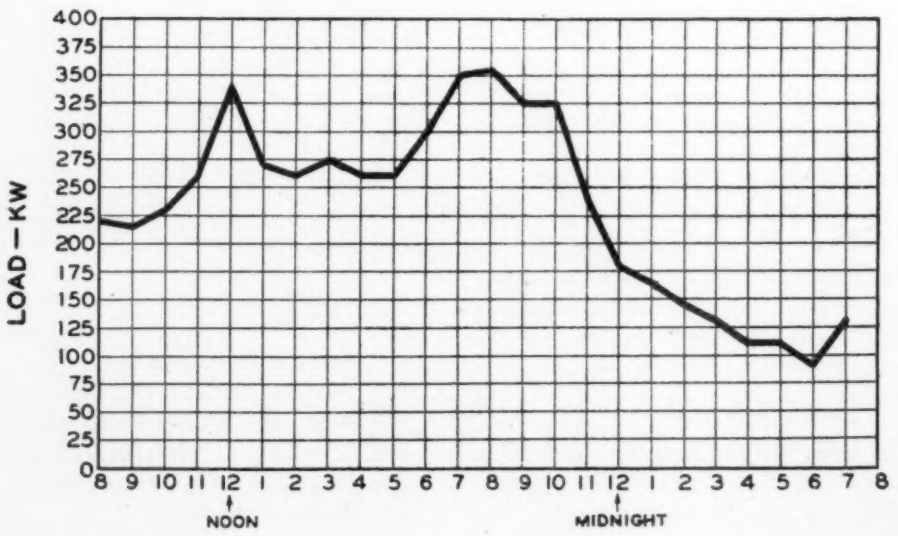
building wall. Exhaust is through the Foster Wheeler waste heat boilers located at the end of the engines, and through the Maxim silencers and the tail pipes above them outside of the building. Inside of the engine room all of the piping is placed in trenches under the floor.

Fuel oil is delivered to the plant by tank trucks and unloaded into a 17,500 gallon storage tank. A motor driven Viking fuel transfer pump fills the two day tanks of 300 and 725 gallons capacity. These tanks are located on a steel tower outside the building at sufficient height for the fuel to flow by gravity through fuel meters to the Diesel engines. Nugent fuel filters are used to clean the Essodiesel 230-A, 30 gravity fuel oil.

Each engine has its own lubricating oil system, and normally the pressure is maintained by the engine driven pump. But motor driven auxiliary pumps and hand operated emergency pumps are available in case of failure of the regular sources. Oil coolers are fitted, and the oil is cleaned continuously by sending it through Cuno-Automatic oil filters. Additional periodic cleanings are given by a Goulds Hydroil centrifugal purifier. The grade of oil used is Standard oil Terola-65.

A closed cooling water system is employed.

*Typical load curve for twenty-four hours.*



The soft water is cooled in an Alco heat exchanger and makeup is supplied through a Permutit water treating system. Raw water is cooled by a spray pond and storage reservoir formerly used for the old steam plant; thus excellent water cooling facilities were available at slight cost. Soft and raw water are circulated by 340 gpm. Westinghouse motor driven Worthington centrifugal pumps.

Starting air is supplied by a Worthington two-stage compressor driven by V belt from a motor. The air is stored in steel tanks located inside of the base of the fuel day tank tower. Placing all of the tanks required for auxiliary equipment outside of the building helps appreciably in cleaning up the appearance of the engine room.

No effort was made to economize on control equipment and instruments. All necessary gauges, Alnor pyrometers, Westinghouse switchboard with complete sets of instruments, including voltage regulators, are installed. The intention was to provide a simple but sufficiently complete layout to permit the operators to have adequate indicators of what the plant is doing and to maintain true and complete performance records.

But how is the steam plant maintained in constant readiness as a standby? That is the function of the Foster Wheeler waste heat boilers. In them steam is generated at 20 lbs. pressure, and they are connected through centrifugal pumps with the boilers of the main steam plant. Actually these centrifugal pumps circulate hot water under 20 lbs. pressure. Operation of these boilers is entirely automatic through the use of regulating devices on the feed water and for maintaining the proper temperature and pressure. In an emergency it would require very few minutes to bring the steam pressure up to working limits and get the steam engine driven generators on the line.

The entire Diesel plant installation cost approximately $97,000, and although it has been in operation only since March, 1937, the savings in operating costs are impressive. Saving in fuel is about one-half, and labor savings amount to about $150 per month. Normally the plant is operated by one operator, but there is a janitor to help on odd jobs and clean up. The electrical maintenance repair shop is on the premises and usually there is a man there who can help in an emergency. The initial seven months' operating record shows a fuel oil economy of 11.2 gross kwh. production per gallon of fuel oil and 1,090 gross kwh. per gallon of lubricating oil. These records were in spite of the none too good load factor.

William C. Olsen, Consulting Engineer of Raleigh, North Carolina, was responsible for the design of the plant and the inspection during construction. The building was constructed by the Goode Construction Co. of Charlotte, North Carolina, and the foundations were placed by J. M. Miller of Rocky Mount, North Carolina. The installation of all equipment was contracted by the Trans-American Construction Co., which is the construction branch of the American Locomotive Co. The operation of the plant is under the jurisdiction of W. A. McAdams, Superintendent of Public Works, who reports to the City Commission of Farmville.

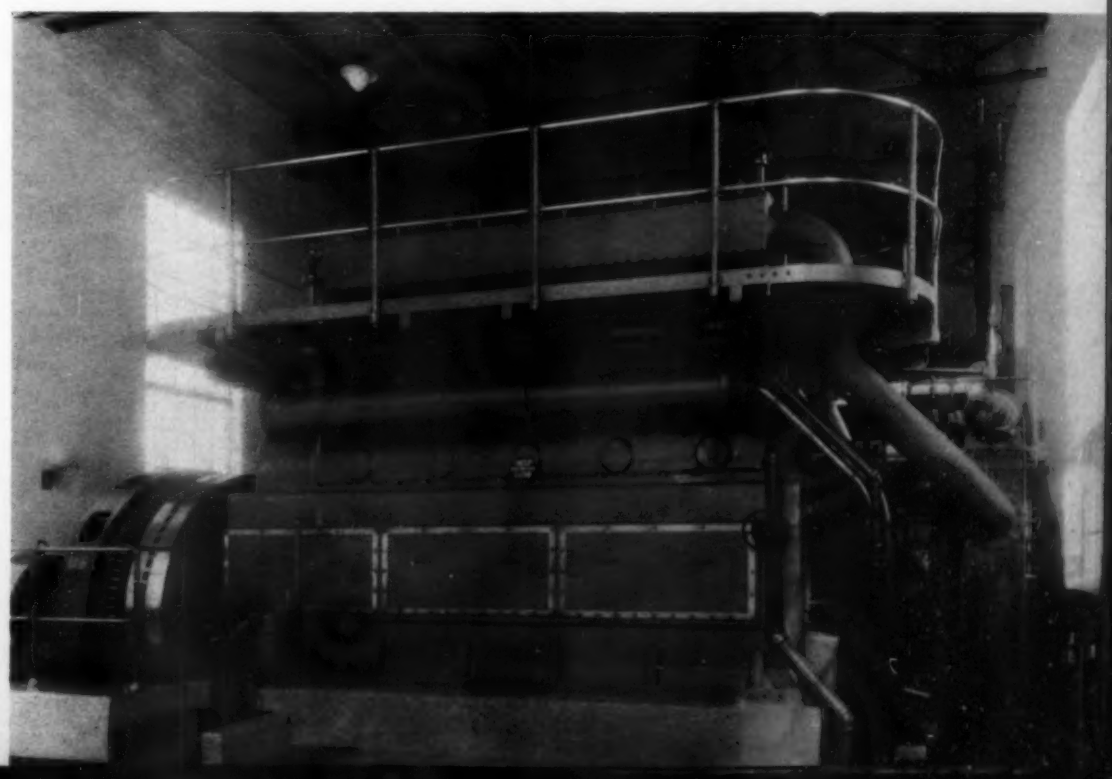
The plant presents a pleasing appearance and is an excellent illustration of the adaptability of the Diesel and its economy of operation.

## A TYPICAL DAILY OPERATING RECORD—OCT. 8, 1937

| TIME | AC. VOLTS | AMPS PER PHASE 1 | 2 | 3 | GROSS GENERATION AC-KWH | DC. VOLTS | DC. AMPS | KVA CAPACITY IN OPERATION |
|---|---|---|---|---|---|---|---|---|
| 8 AM | 2400 | 76 | 74 | 70 | 220 | 90 | 58 | 375 |
| 9 | 2400 | 74 | 68 | 75 | 215 | 94 | 60 | 375 |
| 10 | 2400 | 81 | 75 | 77 | 230 | 95 | 64 | 375 |
| 11 | 2400 | 84 | 78 | 85 | 260 | 102 | 65 | 375 |
| 12 NOON | 2400 | 110 | 103 | 104 | 340 | 93 | 70 | 625 |
| 1 PM | 2400 | 83 | 78 | 79 | 270 | 88 | 65 | 625 |
| 2 | 2400 | 85 | 78 | 81 | 260 | 90 | 66 | 625 |
| 3 | 2400 | 88 | 79 | 83 | 275 | 91 | 66 | 625 |
| 4 | 2400 | 88 | 78 | 82 | 260 | 90 | 65 | 625 |
| 5 | 2400 | 84 | 78 | 82 | 260 | 90 | 65 | 625 |
| 6 | 2400 | 86 | 82 | 84 | 300 | 88 | 64 | 625 |
| 7 | 2400 | 108 | 108 | 120 | 350 | 108 | 71 | 625 |
| 8 | 2400 | 106 | 98 | 110 | 345 | 97 | 70 | 625 |
| 9 | 2400 | 100 | 92 | 106 | 325 | 97 | 70 | 625 |
| 10 | 2400 | 100 | 92 | 106 | 325 | 97 | 70 | 625 |
| 11 | 2400 | 75 | 70 | 78 | 240 | 90 | 60 | 375 |
| 12 MN | 2400 | 58 | 58 | 58 | 180 | 86 | 54 | 375 |
| 1 AM | 2400 | 57 | 58 | 55 | 165 | 82 | 55 | 375 |
| 2 | 2400 | 54 | 55 | 52 | 145 | 80 | 54 | 375 |
| 3 | 2400 | 48 | 50 | 50 | 130 | 78 | 51 | 375 |
| 4 | 2400 | 44 | 44 | 43 | 110 | 74 | 48 | 375 |
| 5 | 2400 | 40 | 42 | 40 | 110 | 72 | 48 | 375 |
| 6 | 2400 | 38 | 38 | 36 | 90 | 68 | 45 | 375 |
| 7 | 2400 | 44 | 45 | 44 | 130 | 72 | 44 | 375 |

### Performance Record for First Seven Months

| *Month* | *Gross kwh.* | *Gallons Fuel Oil* | *Gals. Lubricating Oil* |
|---|---|---|---|
| March | 109,500 | 9,875 | 70 |
| April | 105,700 | 9,589 | 93 |
| May | 107,680 | 9,701 | 86 |
| June | 114,260 | 10,346 | 151 |
| July | 127,210 | 11,413 | 134 |
| August | 142,180 | 12,481 | 118 |
| September | 143,900 | 13,412 | 131 |
| Total | 850,430 | 76,817 | 784 |



*At the rear of each engine is a Foster Wheeler waste heat boiler connecting with the exhaust manifold for heat source.*

# LOG OF THE "BLUE SUNOCO" PROVES DIESEL DEPENDABILITY

CHIEF ENGINEER LEO C. BRUNNER of the Sun Oil Company's motor ship *Blue Sunoco* has recently brought to light a "case history" of Diesel engines that seems to be a fine record in itself and at the same time goes far toward establishing anew the excellent dependability and efficiency of Diesel power in marine service.

Unless it be in the air, we can think of no type of service where the trustworthiness and ability of engines to keep going under any and all conditions means more than in seagoing vessels. Many a seaman can tell of instances where the stamina and reliability of their ship's engines have been the difference between coming safely into port and a ship lost at sea . . . the difference between life and death.

With arguments being heard on all sides as to the relative merits of steam and Diesel propelled ships, abstracts from the log of the *Blue Sunoco's* engine room become at once eloquent testimony for those who have chosen to manufacture or use the latter type of power . . . power which modern marine engineering is endorsing more and more each year.

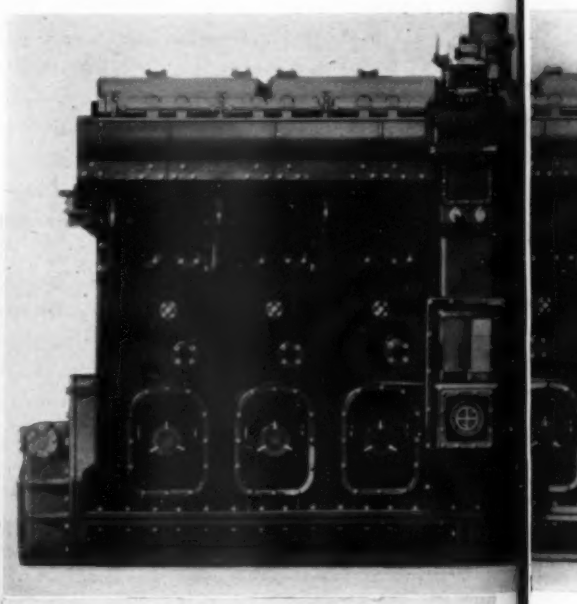
The tanker *Blue Sunoco* is owned and operated by the Sun Oil Company and is used by that company for the transfer of oil in Atlantic coastal waters and the Gulf of Mexico, its home port being Marcus Hook, Pennsylvania. Built in 1928 by the Sun Shipbuilding and Dry Dock Company, the *Blue Sunoco* embodied the very latest developments in tanker design at that time and was constructed to conform to the highest standards of the American Bureau of Shipping.

This ship, a full sized seagoing tanker, designed for service upon both inland waterways and open seas, measures 255 ft. in overall length with an 18 ft. 6 in. molded depth and is capable of making a speed of 10½ knots. Two Cooper-Bessemer Type KR, six-cylinder, direct-reversing, marine Diesel engines, direct drive her twin screws and are rated 500 hp. each at 275 rpm. Two of the same maker's Type F, four-cylinder Diesels power her auxiliary generating sets.

Chief Engineer Brunner claims that each year has seen the *Blue Sunoco's* Diesel engines operating more and more smoothly and with all of their original dependability. To substantiate that claim, he offers records taken from the ship's engine room log . . . has delved into the abstracts of that log and brought forth some figures and facts, dealing with the operation of the ship's engines for the past four years that automatically form themselves into a veritable "Ex Calibar" for those who build, sell and own Diesel engines.

Going back over four busy years, the entries in the ship's log show that from August 1st, 1933, to August 2nd, 1937, the *Blue Sunoco* has made a grand total of 213 trips in the service of her owners. In those trips the vessel has covered a total of 196,582 nautical miles . . . or better than nine times around the world in linear measure.

In those four years of continuous service it is interesting to know that the Diesel engines have seemingly improved with age. The year 1934 saw the delivery of sixty-two cargoes and the ship voyaging 45,910 miles without a stop



due to engine trouble. In 1935, the number of cargoes stood at forty-six and the miles of travel increased to 53,786 without the stopping of both engines at any one time. In 1936 the *Blue Sunoco* was credited with fifty-three trips and a total of 48,634 miles traveled, with but one stop for each of the engines, and these stops not at the same time or causing the vessel to be stopped at sea. The figures for 1937 show that from January 1st to August 2nd the ship has made twenty-five trips and that no stops have been made for either engine at any time in the 29,763 miles of travel.

Further study of the log brings to light the fact that of her four stops made at sea during the past four years, none of these was due to any failure on the part of the *Blue Sunoco's* engines. Once the fouling of a propeller caused the shutting down of both engines for twenty-eight minutes; twice water in the fuel lines caused complete stops of eight minutes each; once the installation of a stop valve on the main fuel line stopped both engines for the fourth and last time in four years for a period of thirty-five minutes.

Either of the two 500 hp. Diesels is fully capable of propelling the *Blue Sunoco* when the other is shut down for adjustment or repair.



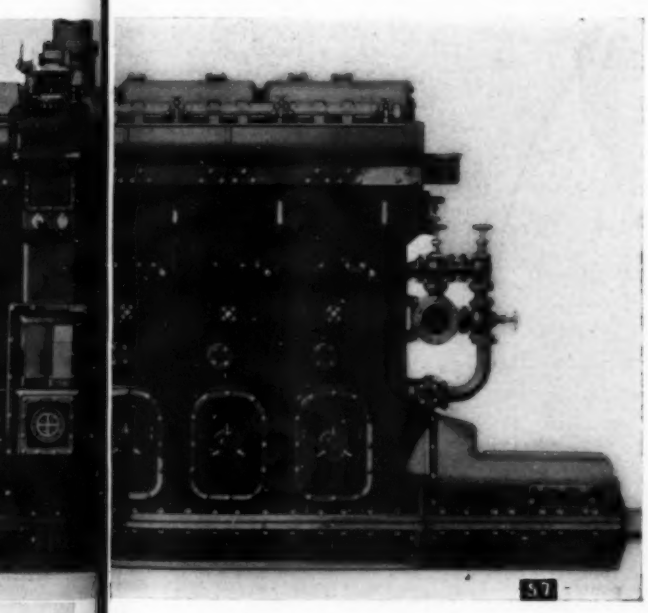

*The "Blue Sunoco" on the ways shows trim stern lines which are not evident when fully loaded at sea.*

Thus, with the vessel still under way, a complete stop is not charged against the two units unless both engines are brought to a dead stop.

rating records is a fair indication of the dependability which other ship owners and operators may rightfully expect after installing

All of the figures set down here sum themselves into the following interesting tabulated record:

| | | |
|---|---|---|
| Total number of trips in four years | | 213 |
| Total number of nautical miles traveled | | 196,582 |
| | No. times | Total time delayed |
| Both engines *Unavoidably* stopped at sea | 0 | 0 |
| Both engines *Avoidably* stopped at sea | 4 | 1 hr. 19 min. |
| (Reasons: Fouled propeller, water in fuel line and installing stop valve) | | |
| SINGLE ENGINE STOPS: | | |
| Stbd. engine *Unavoidably* stopped at sea | 8 | 1 hr. 54 min. |
| Stbd. engine *Avoidably* stopped at sea | 3 | 5 hrs. 35 min. |
| Port engine *Unavoidably* stopped at sea | 6 | 11 hrs. 23 min. |
| Port engine *Avoidably* stopped at sea | 2 | 2 hrs. 10 min. |
| Total single engine stops | 19 | 21 hours |



*The Sun tanker and one of her Cooper-Bessemer Diesels which turned in such remarkable performance records.*

To those who know both types of marine power, we believe the above figures leave nothing to be desired in the way of proof as to the Diesel engine's absolute efficiency and reliability. Credit is due Chief Engineer Brunner and his crew who, through their fine handling, have enabled the *Blue Sunoco* to compile such an excellent record.

The foregoing statement of marine Diesel operation records is a fair indication of the dependability which other ship owners and operators may rightfully expect after installing such economical motive power. The Cooper-Bessemer Diesels were run-of-mine, factory production units and, as the record shows, received proper but not special treatment from the engineroom crew. The service was continuous and grueling and constituted a fair operating test for any type of marine propulsion equipment. The results are exactly what thousands of other marine Diesel owners expect and achieve, year in and year out.



*Mr. Robert Holleman, owner of the Artesia Ice Plant, Artesia, California.*




*The 200 hp. Venn-Severin Diesel and Mr. Holleman's plant where it operates with such remarkable economy.*

# ARTESIA ICE PLANT

*By* ORVILLE ADAMS

WHEN a Diesel engine pays for itself and shows a saving in less than three years against electricity at 9 mills per kwh., while operating an ice plant in a big city like Los Angeles, where power rates for this service are always attractively low, the incident must be classified as top-flight news. The Artesia Ice Plant, Artesia (Los Angeles), California, installed a 200 hp. Venn Severin engine direct connected to a 10 x 10 York ammonia compressor through the hub of the 100 kva. flywheel type generator operating at 300 rpm. They have paid for the engine and the generator and show a cash saving annually which amounts to at least 25 per cent on the investment.

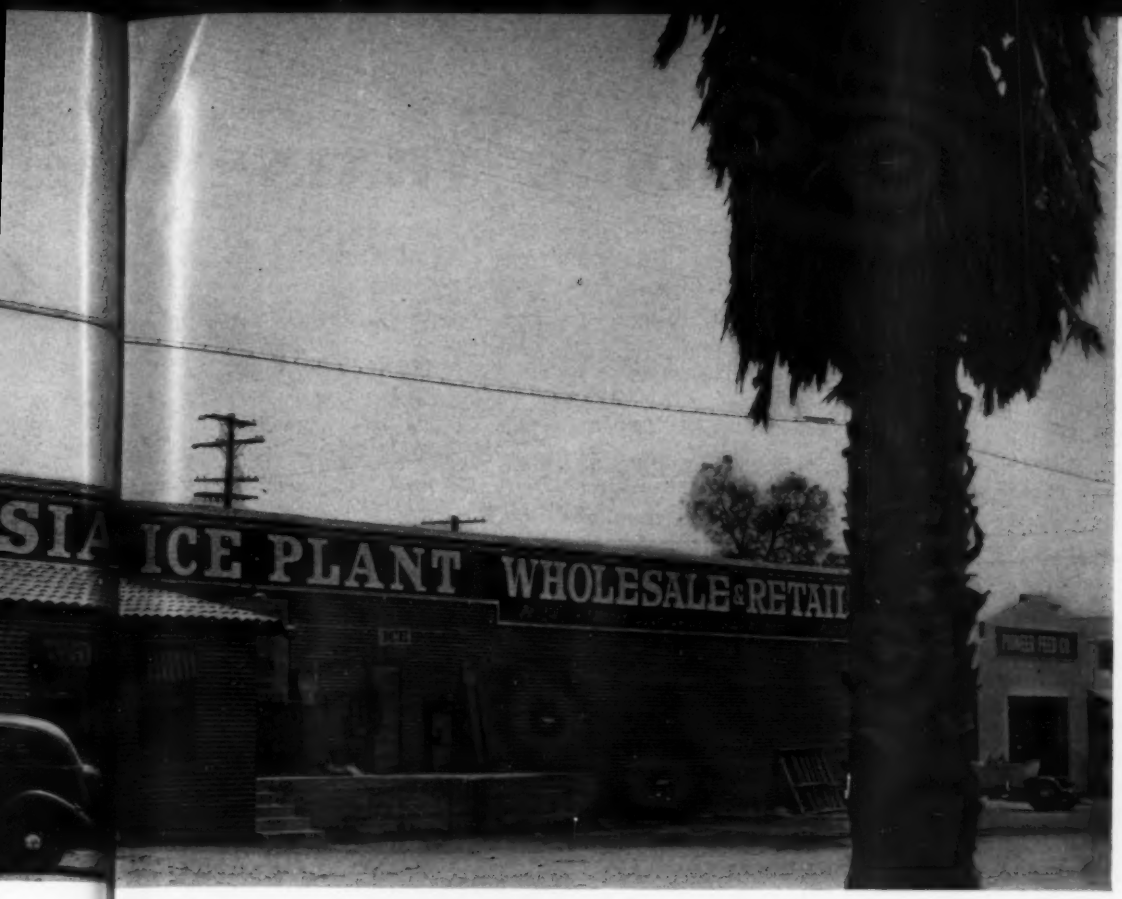
According to Mr. Robert Holleman, owner and manager, the fuel consumption is around 200 gallons per day on a production of 36 to 38 tons of ice, or a fuel consumption rate of approximately 0.424 lbs. per hp. hr. and a lubricating oil consumption of 9 quarts per 24 hours' operation. Based on the average price of fuel oil at the present time, this amounts to 3.75 mills for fuel oil. With a fuel and lubricating oil cost well under ½ cent per kwh., or a saving over electricity of approximately 30 cents a ton, the saving amounts to $10 to $11 per day – better than $3,600 a year. The result is that ice is manufactured in this plant for approximately 65 cents per ton, including power and labor cost.

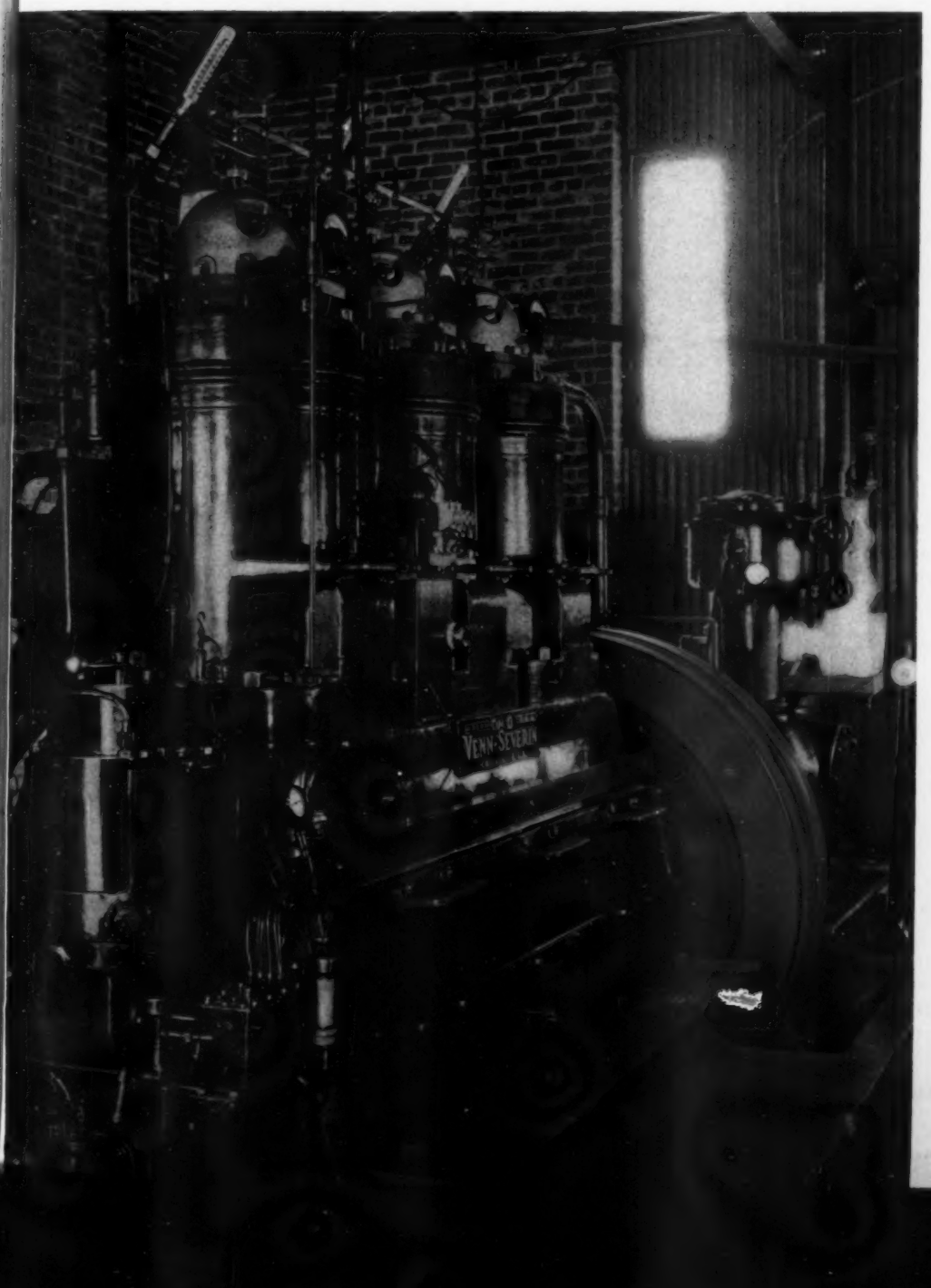
The engine is a two cycle, solid injection oil engine, operating on low compression, resulting in a mean effective pressure of 32.4 lbs. per sq. in., based on a maximum pressure of 280 lbs. per sq. in., and a compression pressure of 170 lbs. per sq. in.

The engine is equipped with electric heating plugs, eliminating the use of a heating torch for starting the engine in cold weather, the current being taken from the electric connections at the board.

A closed cooling system, comprising cooling tower and coils and the use of two Goulds centrifugal pumps, one belt driven from the engine, is employed and only pure water is used in the system. The cooling water outlet and the exhaust temperatures are indicated by Motoco thermometers. Starting is by means of compressed air, employing a Gardner Denver air starting compressor.

The alternator is the flywheel type with revolving stator built by the Ideal Electric Company, the exciter being the same make and V-belt driven.




In addition to a Madison-Kipp lubricator, the engine is also equipped with an oil cooler and filter that recirculates the lubricating oil from the sump direct to the engine by means of a pump. There are Cuno filters on both the lubricating and the fuel oil lines.

The switchboard was designed and built by the Diamond Electric Company. It is the dead front type, with essential instruments for measuring the output and metering the consumption of the motors, lights and auxiliaries.

An interesting feature of this engine is that it is provided with an automatic stop if the cooling water or lube oil pressure drops below the safe operating range. This affords protection of the engine without the necessity of constant attention by the operator.

Lubrication by measured flow and pressure circulation to all bearing surfaces insures dependable operation.

Another interesting feature about this installation was a set of cards showing practically full Diesel shape, yet the maximum pressure did not exceed 300 lbs., the maximum pressure being softened by a pre-ignition chamber, properly shaped orifice injection and an injection pressure of less than 700 lbs. At that, the engine showed a fuel economy rarely exceeded by a full Diesel engine. According to Mr. Holleman, this is the feature that interests him most, even though the economy was less, for, he says, the upkeep and maintaining proper compression pressures is less and operation is easier.

The engine is operated twenty-four hours a day, being shut down every two weeks for inspection, carbon cleaning and routine adjustments, if any, at which time an 80 hp. Fairbanks-Morse engine is operated to hold the tank temperature while the engine is being cleaned up. This unit is belt driven to a horizontal ammonia compressor for standby services. Since there is a regular year-around demand for ice, all sold at wholesale at the present time under contract arrangement, the plant must operate every day in the year. That this is done without a duplicate, or standby unit, except the small unit mentioned, speaks definitely for the dependability of the operation.

The exhaust pipe from each cylinder leads into a pit from which the exhaust passes through a silencer and stack on the outside of the building. The exhaust pipes as shown are provided with removable caps for inspection and cleaning of the pipe and ports.

# THE LATEST IN STREAMLINED TRAINS

*By* CHAS. F. A. MANN

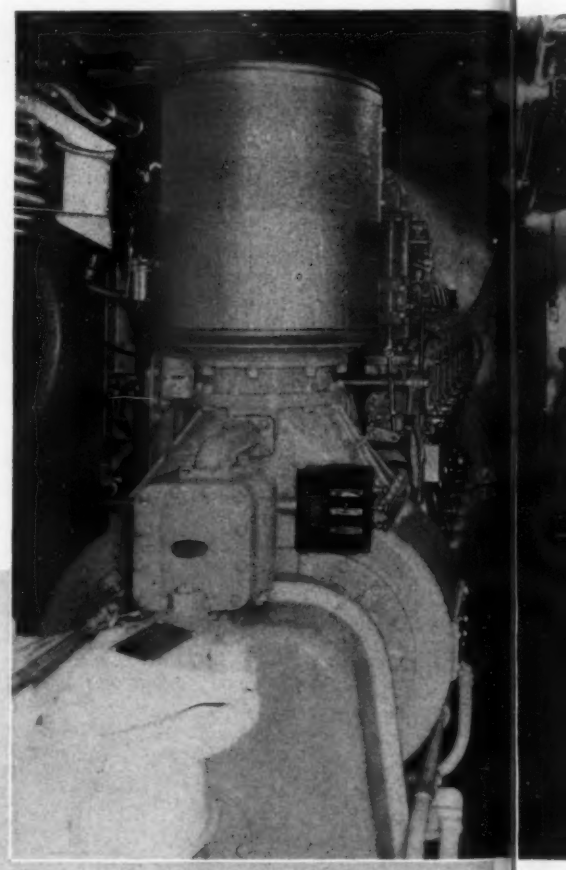
ON December 15th in Chicago and on December 18th in New York, literally thousands of people went down to the local railway terminal to see the latest in Streamline Trains—Union Pacific's *City of Los Angeles*. A seventeen car, 5,400 hp. Diesel electric train with many unique features. The combined product of the Electric Motive Corporation, a division of General Motors, and the Pullman Company.

Whilst the Diesel locomotive is conservatively rated at 5,400 hp. there is an additional 1,200 hp. of auxiliary power, so that comparative rating (with a steam locomotive) is 6,600 hp. Main engines, six in all, two to a car, are standard 900 hp. two-cycle engines of the same style and make as in previous Union Pacific Streamliners. Auxiliary power is provided by a pair of 600 hp. two-cycle engines of the same cylinder size. Eight big engines on this locomotive, but all parts interchangeable, not only with each engine in this train but with each engine on all other Union Pacific Diesel trains. The *City of Los Angeles* carriers General Electric transmission equipment and its twin, the *City of San Francisco,* is similarly equipt by Westinghouse.

Total locomotive weight with a full supply of fuel, water and sand, approximates 877,300 lbs. This weight is 298,000 lbs. for the first unit and 289,650 lbs. each for the second and third units. Each of these weights is divided between the two 6-wheel trucks, and further proportioned to the two driving, and single idle axle of each truck. This distribution provides an average wheel loading at the rail of 23,730 lbs. for the idle axles and 24,690 lbs. for the drivers.

All truck assemblies are interchangeable, with weight including motors approximately 50,000 lbs., and have a 14 ft. 1 in. rigid wheel base. The truck frame and swing bolster are of cast steel, while the spring planks are of strain-relieved welded construction. High molybdenum, low carbon, rolled steel wheels 36 in. in diameter, are mounted on three AEREA E-11-X axles having 6 in. x 11 in. journals. The maximum journal load is 22,650 lbs., which is carried on special SKF double row bearings.

Improved riding qualities, and greater stability in negotiating curves at high speeds, have been obtained by a new treatment of load suspension. The truck frame is supported at four points by twin group coil springs of silico-manganese steel, which ride on four equalizers carried by the journals. The bolster casting is supported at each corner by a pair of chrome-vanadium elliptic springs. These springs ride on two welded steel spring planks, which in turn are carried by swing hangers pivoted from the outside of the truck frame. Lateral oscillations of the bolster are dampened by four hydraulic shock absorbers which also act to ease the body load against the truck frame when entering or leaving curves. Each truck has two traction motors geared direct to the outer axles, and carried in conventional manner between the driven axles and the truck transoms. The center axle is idle and is necessary for load carrying purposes only.





Although the second and third units of the locomotive are equipped for independent operation in yard movements such as turn-table maneuvers, the locomotive main throttle is located at the control station in the operator's cab at the front end of the leading unit. The streamlined contour of the head end is designed to provide maximum safety and visibility for the operator and also effect a minimum wind resistance at high speeds.

Seated in a deeply upholstered adjustable seat, the operator has a clear vision of both sides of the track ahead through slanting automotive style windshields.

At the head of each engine there is what is termed a local control station, from where the attendant may check the operating condition of each individual power plant. A local control station comprises, fuel and lubricating oil gauges, tachometer, 12-point Alnor exhaust pyrometer, and engine water thermometer. It also includes engine start and stop buttons and an isolation switch having two positions, ON and OFF. Moving the switch handle to OFF position opens all electrical control circuits to that power plant and reduces the engine speed to idle, irrespective of the operation of the remaining power plants. Returning the switch to the ON position closes the control circuits, and the engine immediately responds to the power demand being called for by the operator or position of the locomotive throttle.

Other engine equipment includes Nugent filters and Woodward governors.

The *City of Los Angeles* is jointly owned by the Union Pacific and Chicago & North Western railroads, and the *City of San Francisco* by the Union Pacific, Chicago & North Western, and Southern Pacific railroads.

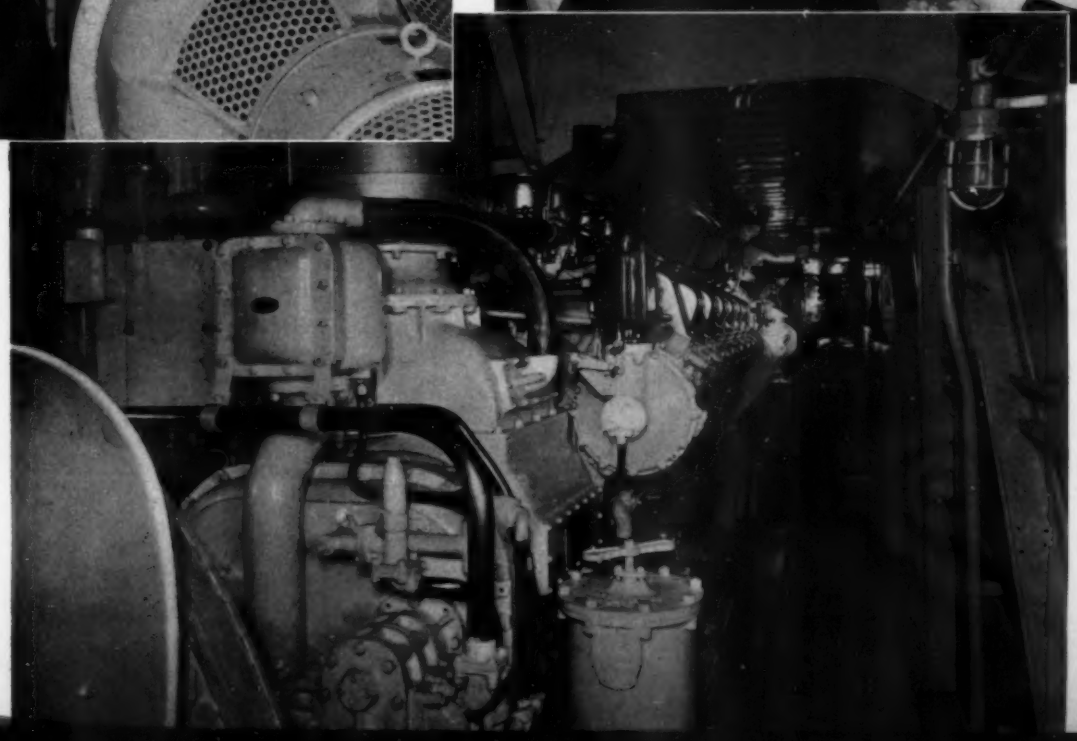
Thus the march of Diesel railroad progress proceeds to new highs. At this crucial point in railway history such advances in operating economy, reduced weight of rolling stock and improved accommodations for the traveling public are of paramount importance. It is significant that Diesel Streamliners are invariably "sold out" on every trip with waiting lists for reservations in many cases.

*Engine room views show the two auxiliary General Motors Diesels of 600 hp. each placed in parallel and two of the six G-M main drive units in tandem. The lubricating oil filters appear in the lower illustration.*

*"The Little Nugget" bar car is reminiscent of the Gay Ninetys and affords a pleasant lounge for refreshments. Below — Sleeping coach interiors present modern lines in affording maximum convenience and privacy.*









# JEANNE D'ARC AND VILLANOVA

TWO trawlers built as sister-ships by the Bath Iron Works to the order of F. J. O'Hara Sons Company have recently gone into commission, sailing from the Boston fish pier. Named the Jeanne D'Arc and the Villanova, the latter is illustrated here.

Designed by Thomas D. McInerney, they were built of mild steel and classified under the survey of the American Bureau of Shipping. Overall length is 136 feet 4¼ inches, molded beam 24 feet, molded depth 13 feet 6 inches. Riveted construction is used throughout except that the fuel tank section amidships and the fuel tank section forward are welded. The fish hold has a capacity of 400,000 lbs. and is completely insulated with extra thick Armstrong cork.

Concerning space disposition, aft of the fish hold is the cross bunker fuel tank, then the engine room, and finally the living quarters. The boats are not only seaworthy but attention has been given to the living quarters and the comfort of the crew. They are modern boats fully equipped in every way for the strenuous duties they perform. For instance, these are the first trawlers to be equipped with a hydro-electric steering gear of Hyde Windlass make, thus eliminating the rudder quadrant with rods and chains.

The propelling machinery was supplied to a large extent by Fairbanks Morse. The main Diesel engine is a Model 37 seven cylinder, two cycle oil cooled piston, solid fuel injection, direct reversible unit rated at 735 bhp. at 260 rpm. At the after end it is connected to the propeller shaft through a Cutler Hammer magnetic clutch, so that the propeller can be declutched from the engine at will.

Aft of this clutch on the thrust shaft is a Kingsbury thrust bearing. The tail shaft is protected by centrifugally cast bronze sleeves for its entire length. The stern tube bearings are of Goodrich Cutless rubber. The three bladed bronze propeller by Hyde was accurately machined, polished and dynamically balanced.

Direct connected to the extension of the forward end of the main engine crankshaft is a 100 kw. variable speed Diehl direct current generator. There is also a direct connected exciter for exciting the generator fields, or the excitation can be taken from the ship's bus bar. This generator is operated at 125 volts for general ship's services when going to and from the fishing grounds, and at 250 volts for supplying the trawl winch when on the fishing grounds.

The main Diesel engine needs no detailed description here, since it is a standard unit fully described in the Diesel Plan Book and Engine Catalog, Volume 2, beginning on page 41. In the boat, the engine is installed with the scavenging pump forward and the engineer's operating station on the port side. The picture with this article show the appearance of the engine room and the layout of the machinery clearly.

Located conveniently beside the engineer's station is the Westinghouse switchboard. The electrical circuits to the generators are controlled through automatic circuit breakers operated through relays. The various motors are controlled by push button stations operating through contactor panels in water proof cabinets. The lighting circuits are taken from cabinets in convenient places which are fed from the main switchboard through voltage regulators.

Forward of the switchboard on the port side are the two auxiliary generating sets. Each one of them consists of a Model 36 Fairbanks Morse Diesel rated at 40 bhp. at 1,200 rpm. and direct connected to a 25 kw. FM direct current marine type generator. The engines are of the four cycle type with four cylinders, and for a detailed description of them the reader is referred to the Diesel Engine Catalog previously mentioned beginning on page 105. These auxiliary engines are started electrically, energy being taken from a 24 volt Exide battery.

The auxiliary generators supply light and power, or by a throw-over switch on the switchboard this load can be transferred to the main generator driven by the main engine. Floating on the switchboard bus is a 56 cell 343 ampere hour Exide battery. This gives three sources of 125 volt electrical power and provides a very flexible operating setup.

Aft of the switchboard on the port side is the 17 cubic feet capacity starting air compressor. This unit is a little unusual because it is driven by a direct connected 5 hp. FM marine type electric motor. Starting air is also supplied by an attached compressor on the main engine. In order to provide a plentiful supply of starting air for this reversible engine, there are four storage flasks carrying air at 250 lbs. pressure.

The pumps, tanks and the heating boiler for the ship are located on the starboard side of the engine room.

All engines and the compressors are cooled by a closed system. This fresh water cooling system includes the main engine jackets, the auxiliary engine jackets, and the starting compressor jacket. Fresh water is circulated by a pump on the main engine and by motor driven centrifugal pump of 50 gpm. capacity through the jackets, a heat exchanger, and an expansion tank. Provision is made in an emergency for circulating sea water through this system.

For circulating the cooling and lubricating oil through the main engine and for circulating the sea water there are two combination pump units driven by 10 hp. motors.

For ship's purposes there are motor driven



centrifugal or rotary pump units for fire and bilge, fish wash and desk use, and for sanitary services. All of these pumps and their motors were supplied by Fairbanks Morse.

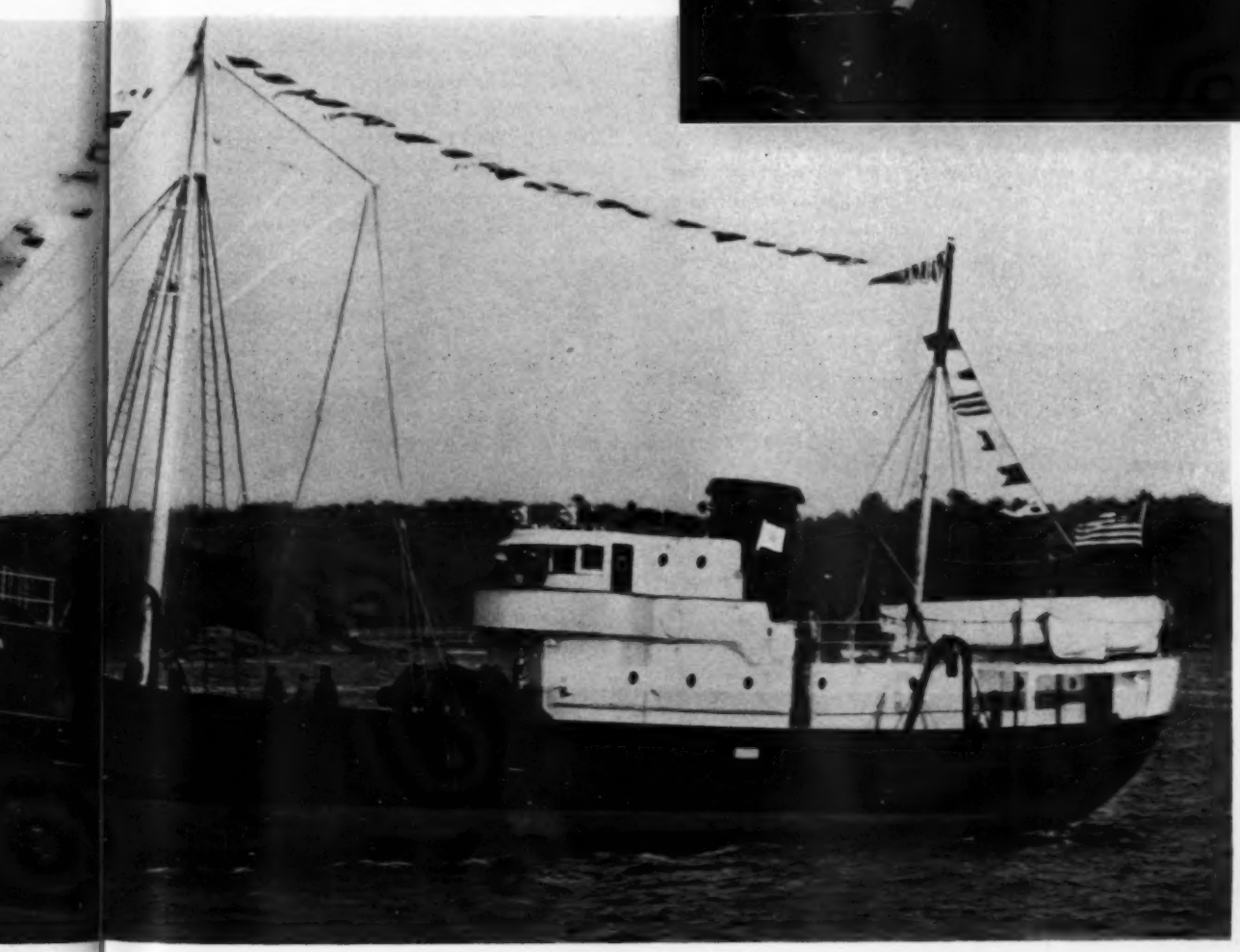
The exhaust pipes from all of the Diesel engines lead up to their respective mufflers in the stack on the superstructure above the engine room. The air intake for the main engine is from outdoors through this stack and down through a trunk to the scavenging pump on the engine.

The gaugeboard for the main engine is located near the engineer's station and is equipped with gauges of the alarm type on the circulating water and lubricating oil systems.

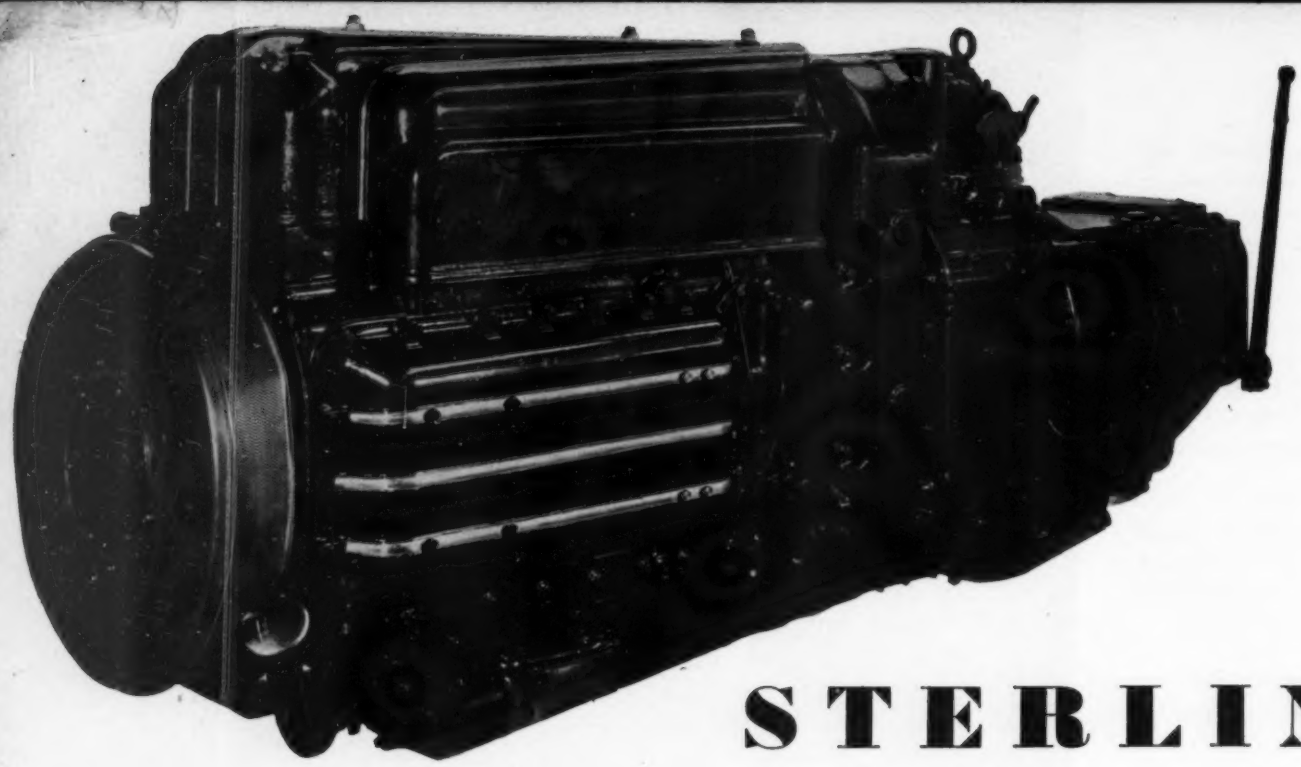
It is evident that these boats have been carefully arranged to provide good access to all of the machinery in the engine room, convenient operation for the engineer on watch, and to have a minimum amount of machinery in operation at any time in order to get the results. These are sturdy boats built to go to sea with comfort for the crew, and economy of operation for the owners. There are no frills but all equipment that is needed is there.



*Port side of the engine room looking forward. In the foreground is the engineer's station with the engine controls. On the left is the switchboard. In the background are the two auxiliary Diesel generating units, and notice the Alnor pyrometer fastened to the scavenging pump cylinder on the engine.*



*These sturdy boats have comfortable living quarters aft, convenient to the engine room, to the pilot house and to the deck machinery.*



# DIESEL

# STERLING

*By* JOHN W. ANDERSON

IN every Diesel engine there is the problem of converting the reciprocating motion of the piston into the rotating motion of the shaft. The usual engine employs the well known combination of connecting rod and crank, but in the Sterling Crankless Diesel the pistons deliver their power directly to the two inclined discs fastened to the engine shaft. There are no cranks of any sort.

The development of the principles involved began several years ago. First there was the development of the Michell or Kingsbury thrust bearing principle where the thrust shoe rides over the oil film on the thrust collar like a toboggan. Then this type of thrust shoe was applied to gas engine compressor units by Michell. Sterling has widened the application to include Diesel engines. Experimental units have been in commercial operation for over a year, and now Sterling is ready to offer these Diesel units for general commercial sale.

The illustrations show the general appearance of these new units, and it will be interesting to first consider the operating principles.

The unit available at present is a 4¼" bore by 5.45" stroke engine rated at 135 hp. at 1,200 rpm. It has an overload capacity and a marine rating up to 150 hp. at the same speed. Under construction there is a 6½" bore by 8½" stroke engine of identical characteristics with an intended rating of 350 hp. at 900 rpm.

Both of these engines have four cylinders, and in each cylinder there are two pistons operating opposed to each other. At each end of the unit is an inclined power disc. At one end of the engine are the scavenging air pumps. Each piston assembly at that end carries, beyond the power disc, a scavenging air piston at the end of a piston rod. These air pistons are single acting, and there are thus four single acting air pumps. The air flow for all of them is controlled by a single rotating valve attached to the main shaft. While all of these scavenging pumps have a common suction from the atmosphere, and discharge into a common receiver space, in effect each piston at that end pumps the supply of air for its own cylinder.

The scavenging and charging process for each cylinder is taken care of by ports. One of the pistons in each cylinder controls the exhaust ports at that end of the cylinder. In the cycle of events, the exhaust ports are the first to be uncovered by the piston so that the products of combustion may escape and the pressure in the cylinder drop to atmospheric before the scavenging air ports at the other end of the cylinder are opened by the piston at that end. Scavenging air enters at from 3 to 4 lbs. per sq. in. pressure. The ports are shaped to give the air a whirling motion as it enters. The motion of this column of air through the length of the cylinder thoroughly sweeps out the residual exhaust gases.

This also charges the cylinder with fresh air, and after the cylinder ports have been covered, this air is compressed between the two pistons as they approach each other to 500 to 550 lbs. per sq. in. The whirling motion of the air persists during the compression stroke, and near the end of it the fuel charge is injected. Number 2 Diesel fuel is recommended for use, and the normal fuel injection pressure is about 2,500 lbs. per sq. in. The maximum combustion pressure is from 750 to 800 lbs. per sq. in.

The average fuel consumption ranges from 0.40 to 0.45 lbs. per bhp. hour. Exhaust temperature is from 500 to 600 degrees F. at full load.

Turning to the mechanical construction of the engine, the frame is a box-like structure of cast iron. There are large hand hole plates at the sides for access to the interior, but during normal operation the engine is completely enclosed. There are two main shaft bearings, with babbitt lined steel shells. For locating the shaft endwise and for taking up any slight thrust, there is a double row ball bearing.

Cylinders are secured in the frame, mounted horizontally. They are of alloy iron, individually removable and with integral water jackets.

The alloy steel shaft has flanges for mounting the inclined power discs. The latter are of alloy steel, hardened, ground and lapped for a smooth surface. Inclined at an angle of about 20 degrees to the main shaft, they are

# EL ENGINES No. 12

so mounted that the loads from the pistons come on the shaft flange and not directly on the holding bolts.

The cast iron pistons have four compression rings and two oil control rings each. Pistons carry bronze lined slipper sockets that thrust against hardened steel slippers, faced with babbitt for rubbing against the power discs. The ball and socket joint on the back of the slipper accommodates the motion of the slipper to the constantly changing angle of the power disc as the disc revolves. For each piston there is a bridge which bridges the outside rim of the disc and carries the slipper on the other side of the disc as well as drives the scavenging piston. The combination of the bridge and the two slippers ensures that the piston motion will follow the motion of the disc.

The accessories are mounted on top of the engine frame for the convenience of the operator. The pumps are gear driven from the main shaft by steel gears mounted between ball bearings.

The gear type pump for the pressure lubricating system delivers the oil through the two Purolator filters and through the cooler to the engine parts. Everything is oiled from the one system and the surplus oil drains to the sump in the lower part of the frame.

The bronze gear type water pump discharges through the oil cooler, the jacketed exhaust manifolds and the cylinder jackets.

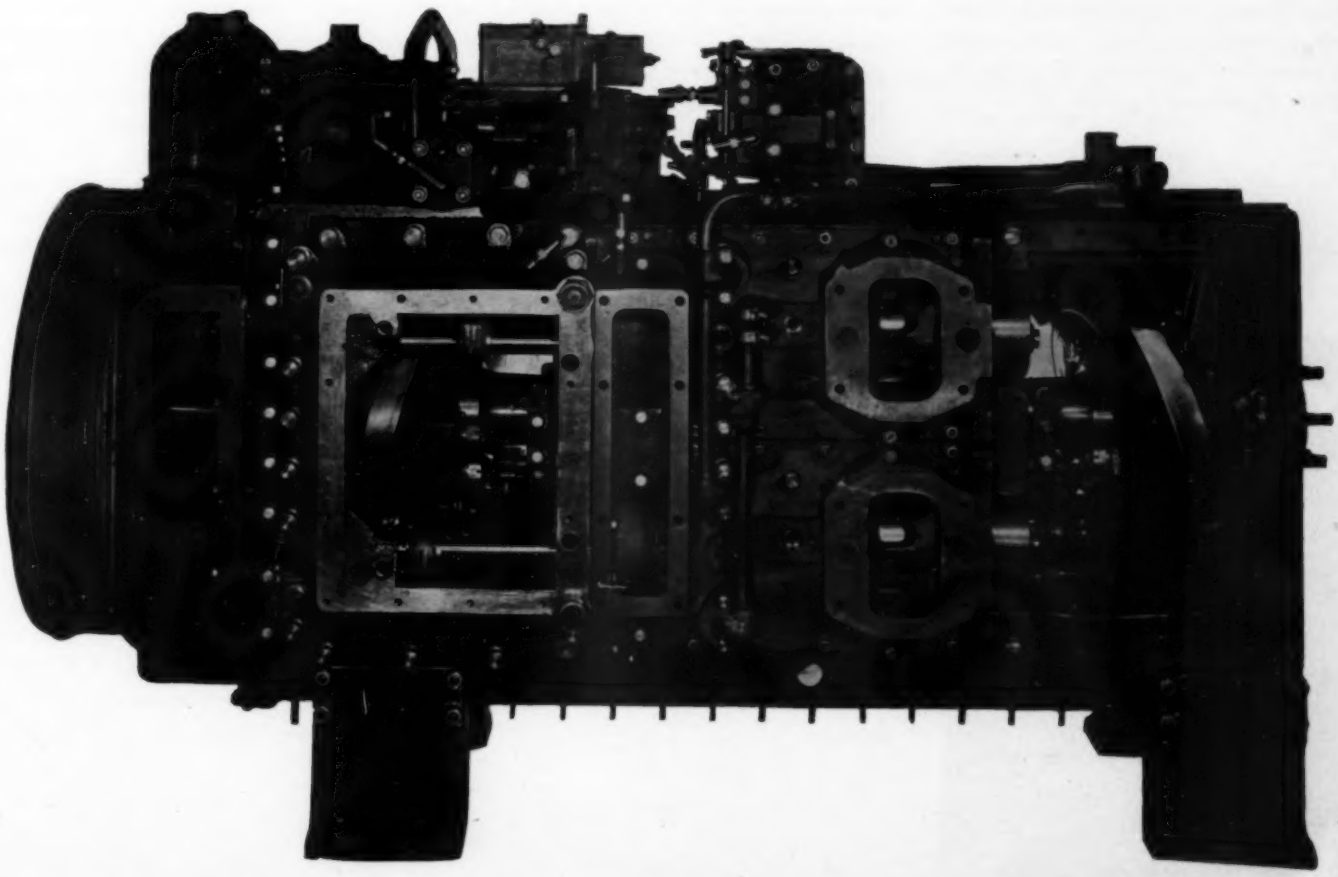
The Ex-Cel-O fuel injection pump is used with automatic advance to change the injection timing to suit changes in engine speeds. The fuel injection valves are of the single orifice, spring loaded type. The fuel transfer pump is combined with the injection pump unit. There are two fuel filters in series, a Purolator and a Skinner. A governor for controlling the engine speed is built into the fuel injection pump unit.

Electric starting is accomplished by a 32-volt starter with a double throw switch. The first position of the starter switch employs 12 volts to engage the Bendix gear. The second position employs the full 32 volts and rotates the engine.

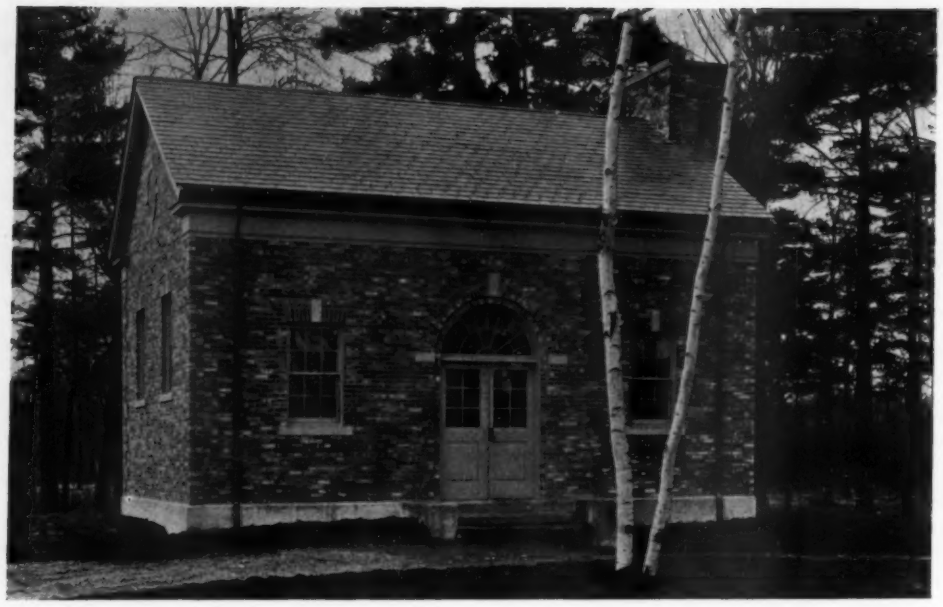
For stationary service, the main shaft is extended for direct connection to the generator. For marine service, built-in reduction gears are available giving maximum propeller speeds of 1,000, 800, 600 and 520 rpm. The engine operating speed range is from 400 to 1,200 rpm. At the after end of the engine unit is an oil lubricated multiple disc clutch marine reverse gear and a propeller thrust bearing. The oil pan under the engine frame is extended to carry these parts and all of them are lubricated by the engine pressure lubrication system. The marine engine complete weighs 29 pounds per rated horsepower, while the stationary unit weighs about 26 pounds. These engines, due to their construction, have a good running balance, but need a foundation for carrying the weight, taking the torque reaction, and holding the alignment with the driven machinery.

Among the features claimed for these engines are lower center of gravity than the usual vertical reciprocating type of engine and better accessibility. The lower center of gravity is due to the location of the cylinders around the shaft, not above it, as in the usual engine. All parts inside are quickly accessible by removing the side plates. It is claimed that any of the slipper bearings may be removed in 2 minutes. All 8 pistons can be removed in about 2 hours. By removing the exhaust manifolds, the exhaust ports are exposed, and by barring over the engine by hand, the condition of the piston rings can be noted as they pass the ports.

Sterling has made the dies, jigs and fixtures necessary to produce the parts of these engines and have them interchangeable, and the 135 hp. engine is now in normal shop production.



# NEEDHAM MASSACHUSETTS DIESEL PUMPING STATION



*Citizens of Needham believe in attractive public buildings. This one houses the Diesel pumping plant.*

DIESEL driven water pumping plants that receive only intermittent attention are neither new nor unusual, but every additional example of this sort is interesting. And this Needham plant enjoys the distinction of being the first Diesel engine driven turbine pump installation in New England.

Needham has previously depended upon two electric motor driven pumps for its water supply, but faced with the necessity of locating a new source due to improved business conditions and to an increasing population, the engineering firm of X. Henry Goodnough, Inc., was retained to work in cooperation with Lester C. Hollis, Superintendent of Public Works, and Roger G. Oakman, Superintendent of Water Department, and make a thorough study of the supplies available. This investigation resulted in the awarding of a contract for a new 93-foot gravel packed well which, when completed, yielded a test capacity of four and one half million gallons a day.

Following this the attractive stone house shown in one of the pictures was erected, and Fairbanks, Morse were given the contract for a 12-inch, 13-stage, oil lubricated, bronze fitted, turbine pump, driven through a Farrel-Birmingham right angle drive by a single cylinder, 75 bhp., model 32, 14 by 17 inch, two-cycle, solid injection Diesel. This installation is rated to deliver 350 gallons per minute against a total dynamic head of 305 feet into the present distributing system, and 700 gallons per minute at 270 feet head into the proposed extended distribution system.

The compactness of the installation is evident from the interior view of the station. The Diesel engine in the foreground is of standard design and needs no extended description here. This has been done already in the DIESEL PLAN BOOK AND ENGINE CATALOG, Volume 2, beginning on page 21. The top of the right angle gear drive can be seen beyond the flywheel; and beyond that on the wall is mounted the gaugeboard for the water plant.

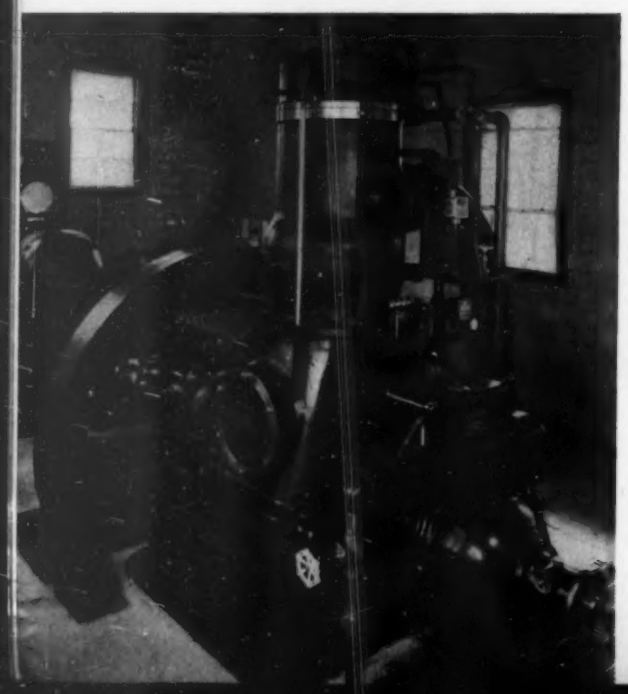
All of the piping is taken to and from the Diesel through the pipe trench under the floor. The exhaust is out through the chimney at the end of the building. Observe the I beam overhead for handling the engine, gear drive, and pump parts when overhauling. The whole installation has been made as simple as possible.

As already stated, there is no regular attendant. One of the Water Department men visits the station at 8 a.m., noon, 4 p.m., 7 p.m. and 10 p.m. for a general check-up. At the 4 o'clock visit the fuel tank is filled. Then at 2 a.m. the police squad car stops, and checks to see if the engine is still running. This pumping station is situated about 2 or 3 miles from the center of the town, and the district is not covered by a regular police beat. The Police Department, therefore, uses the pumping station as a call box, and the patrolman looks over the engine as a part of his routine call. The engine is equipped with safety devices which shut it down in case of trouble with the cooling or lubricating systems.

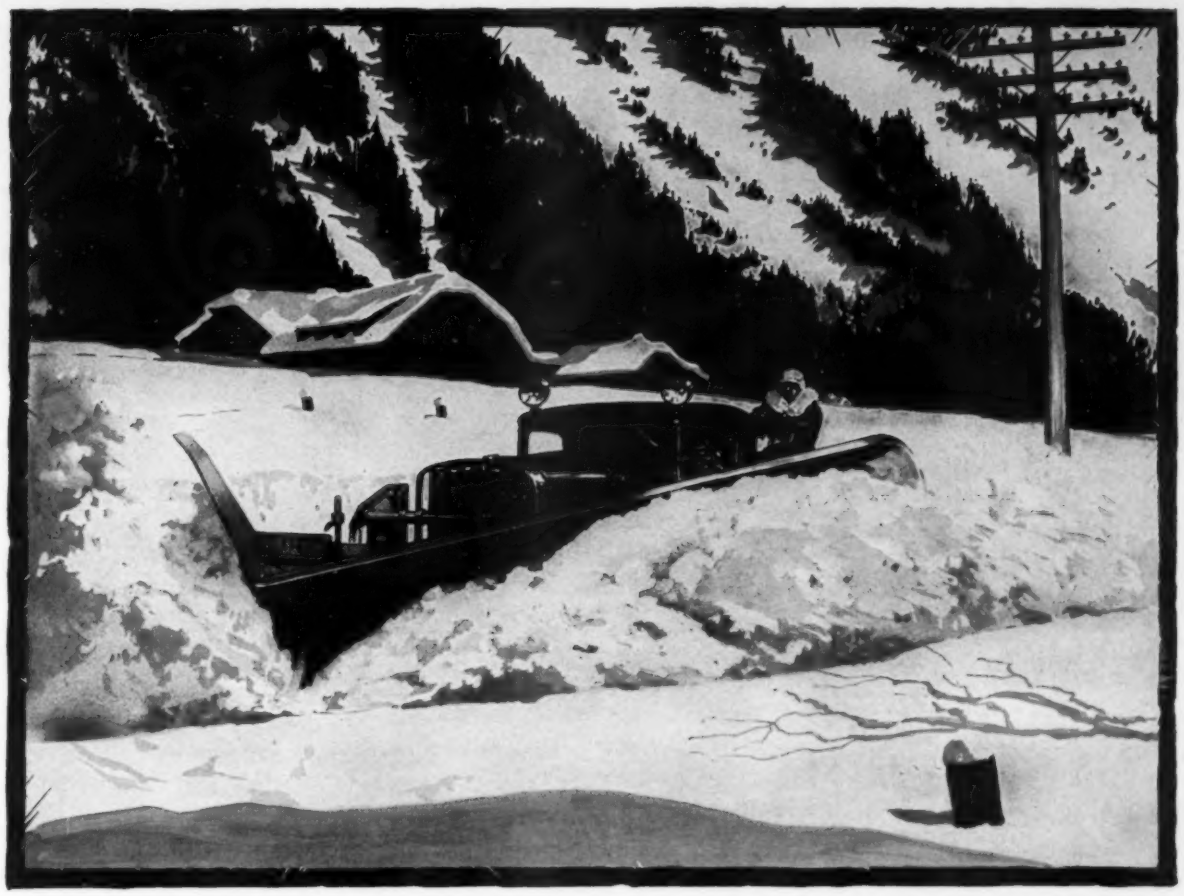
The official acceptance tests showed the actual fuel consumption per water-horsepower hour was 0.649 lbs. when pumping 350 gallons per minute at 309 feet head and 0.494 lbs. when pumping 702 gallons per minute at 272 feet. The corresponding figures for fuel cost per million gallons (fuel at 5 cents per gallon) were $5.85 and $3.95, as against $35.00 in the motor operated station. The test figures were apprceciably better than the contract guarantees.

Since its installation in January, 1937, the plant has been operated almost continuously at about two-thirds of its capacity, and has proved so dependable and economical that the motor operated stations have been shut down except for two or three hours use per day, and are now used mainly for standby purposes.

*A fine example of compact machinery arrangement which includes a Fairbanks-Morse Diesel, Farrel-Birmingham right angle drive and turbine pump with gauge board visible beyond the flywheel. No regular attendant is on duty.*



## WINTER HIGHWAYS KEPT CLEAR WITH HERCULES POWER



When snow flies, hundreds of communities depend on Hercules Power to sweep away the drifts—to clear roads and streets for traffic. Leading makers of trucks and tractors, used for the gruelling task of snow removal, select Hercules Engines. These powerful engines operate economically and smoothly with simplified maintenance. The dependable character of Hercules Power—both Diesel and gasoline—its rugged, long life, is being proved daily on the highways, on the farms and in the oil fields of the world. Hercules Engines are the product of over twenty-two years' experience in designing and building heavy-duty power plants exclusively. This has been the sole and specialized activity of the Hercules Motors Corporation—it has no other products.

*Hercules Marine Diesel Engines supplied by Kermath Manufacturing Company, Detroit, Michigan*

**HERCULES MOTORS CORPORATION, CANTON, OHIO**

America's Foremost Engine Manufacturer — Power Plants from 4 to 200 H. P.

# HERCULES DIESEL ENGINES



# DIESEL TUGS, "DRAVO Nos. 41 and 42"

THE Dravo Corporation has recently placed in service two single screw shallow draft towboats. The first boat, known as *Dravo* 41, is equipped with the Dravo system of skegs and rudders as developed for use in single screw shallow draft towboats and first used on their towboat *Pioneer*. This system uses twin skegs so arranged as to eliminate the "side crawl," characteristic of a single screw tunnel boat.

The second boat, *Dravo* 42, is from the same lines, has the same power plant, but is equipped with a Kort nozzle propulsion system. This device also eliminates the "side crawl" in a single screw tunnel boat, and gives added thrust without increased horsepower. The Kort nozzle has been successfully installed on more than 400 vessels abroad. The advantages to be gained through its use have been very well defined when related to sea going or harbor vessels, such as tugs and trawlers. They have also been well defined on shallow draft vessels where the fleet is towed aft on a line. For use on American rivers, where a flotilla is pushed by the towboat, it is necessary that maximum power be available for backing and maximum steering thrust obtained when backing. It is planned to compile comparative performance data on the two vessels, and some interesting facts undoubtedly will be revealed.

Preliminary tests made on *Dravo* 41 have shown very satisfactory results. The builder's predictions for the boat were more than realized as this boat has been shown to have a backing power equal to its going ahead power, both figures being measured at dock test or 100 per cent slip. As far as is known, it is the only screw boat with this proved ability and in this respect is superior to stern wheel towboats, wherein the backing thrust is always considerably less than the forward thrust.

These vessels have an overall length of 94 feet, a beam of 21 feet, and a depth of six feet nine inches. The draft, in fully loaded condition, is four feet nine inches aft and five feet forward. *Dravo* 41 in trials has shown a light speed of 11.6 miles per hour.

The vessels are equipped with six cylinder 12½" by 18" Nelseco Diesel Engines, factory tested to 350 hp. at 280 rpm. In service they will operate at horsepowers ranging from 300 to 350 depending on the load, and will be directly connected to the screws.

The towboats are of all welded steel construction, both as to hull and superstructure. The hull is divided into four principal water-tight compartments and two fuel oil tanks, the total fuel capacity being 5,600 gallons. These vessels are somewhat unusual for river towboats in that they have a fully modeled bow. This bow has demonstrated its worth not only from the viewpoint of overcoming resistance but also from its ability to throw ice and drift to the side rather than under the boat. In addition, the modeled bow gives excellent steering and maneuvering qualities to the boat, either with or without tow.

There are no accomodations below the main deck. The crew is quartered in two man cabins, there being four such cabins on the main deck. Accomodations are sufficient for a double crew, permitting operation of the vessel 24 hours a day. The main deck also contains a crew's lounge, a combination galley and mess, and two toilet rooms. On the upper deck are quarters for the master and pilot. Slightly raised above the upper deck is the pilot house.

The boats are controlled completely from the pilot house by means of a control pedestal using Bendix-Westinghouse control valves. Hydraulic steering is fitted, a single ram controlling the twin steering rudders and twin backing rudders. Power for the steering ram is obtained during long runs through a hydraulic pump chain driven from the main shaft. A second motor driven hydraulic pump is fitted, which has an electric pressure control switch. When insufficient pressure is produced by the

shaft driven pump as in maneuvering, the electric pump picks up the load.

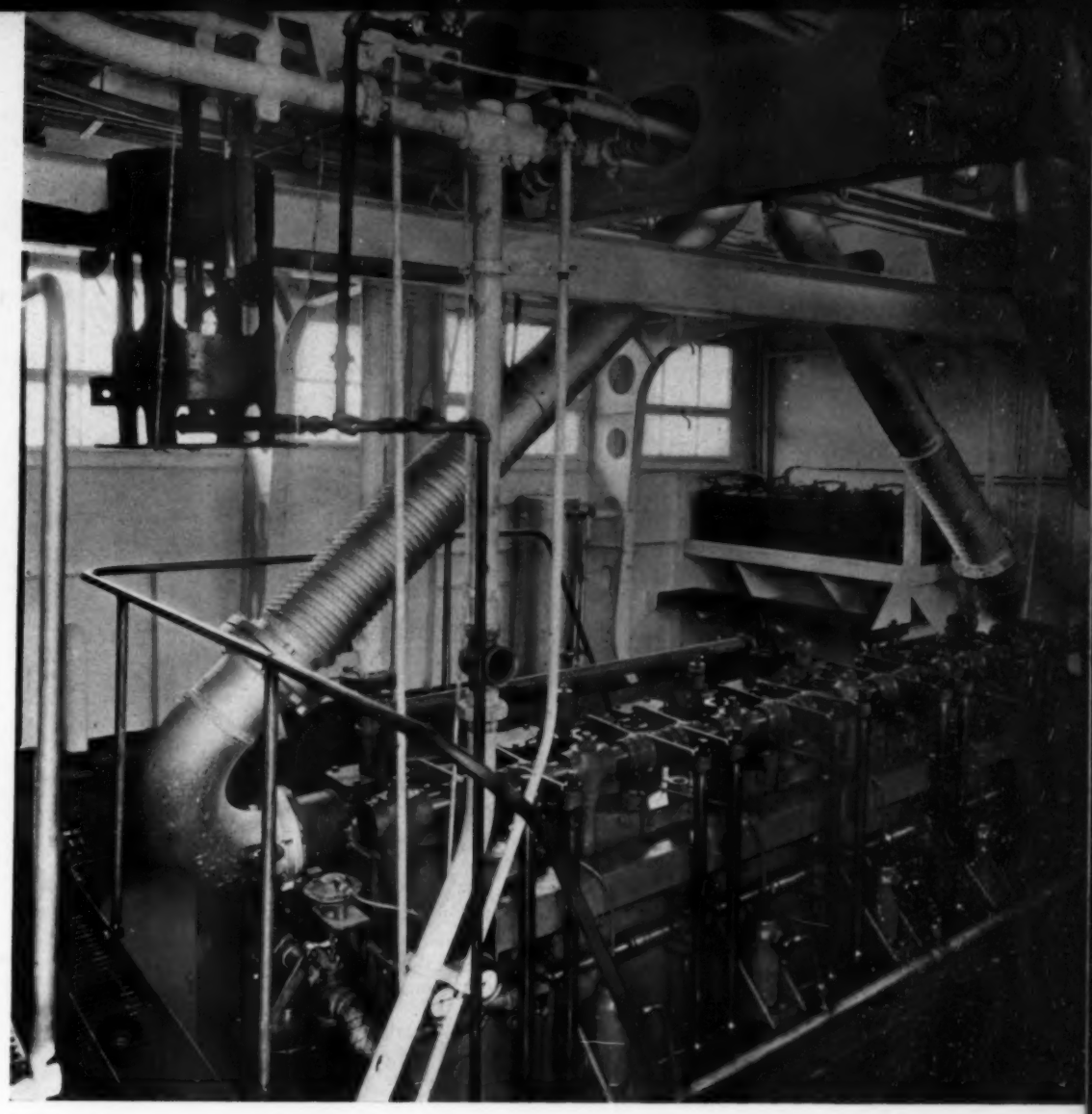
The vessel is equipped with a 1000 watt incandescent light on the pilot house roof and a pilot house controlled arc searchlight located forward on the upper deck.

Auxiliary power is generated by a 20 kw. National Superior 4 cylinder Diesel generator set, mounted on Korfund vibro-dampeners, the power being used for the 15 and 10 hp. air compressors, the 10 horsepower Dravo capstan, and the usual lighting circuits. A 56 cell "Philco" storage battery is "floated" on the line. In addition to generating electricity the auxiliary Diesel engine is "V" belt connected to a 100 gallon per minute fire and bilge pump.

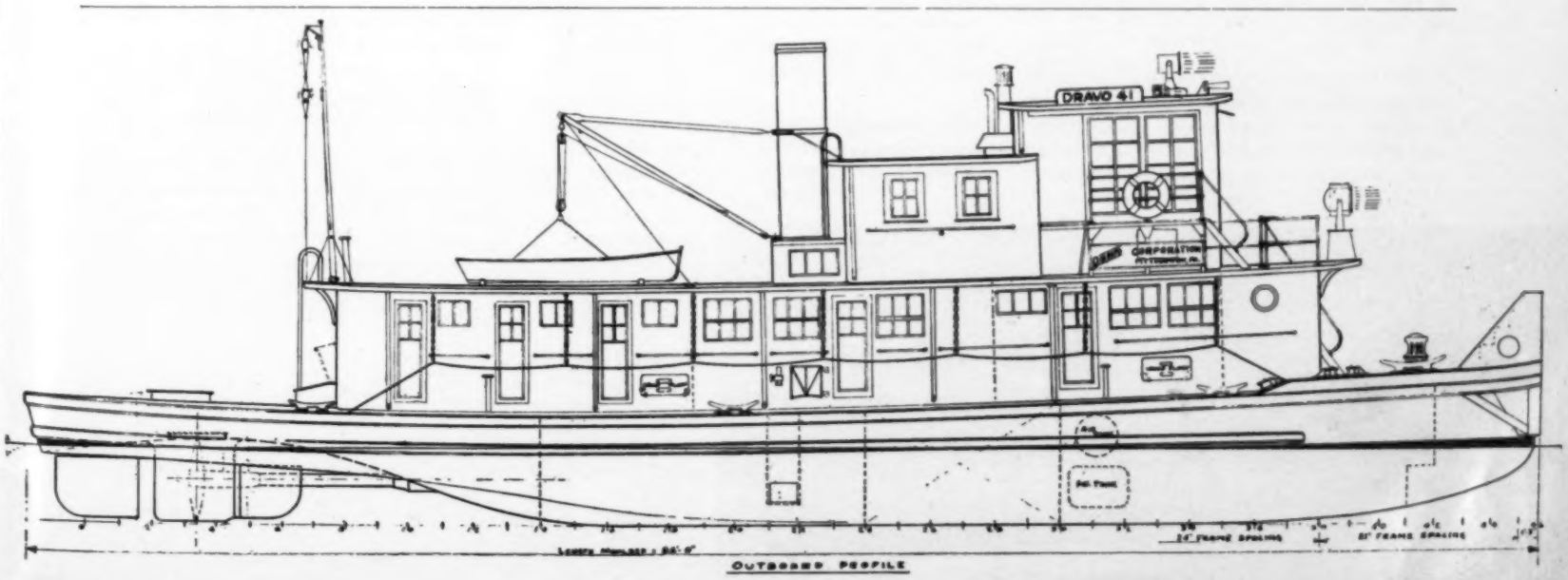
These boats have a steam heating plant consisting of an oil fired Pacific boiler furnishing steam to fan driven unit heaters.

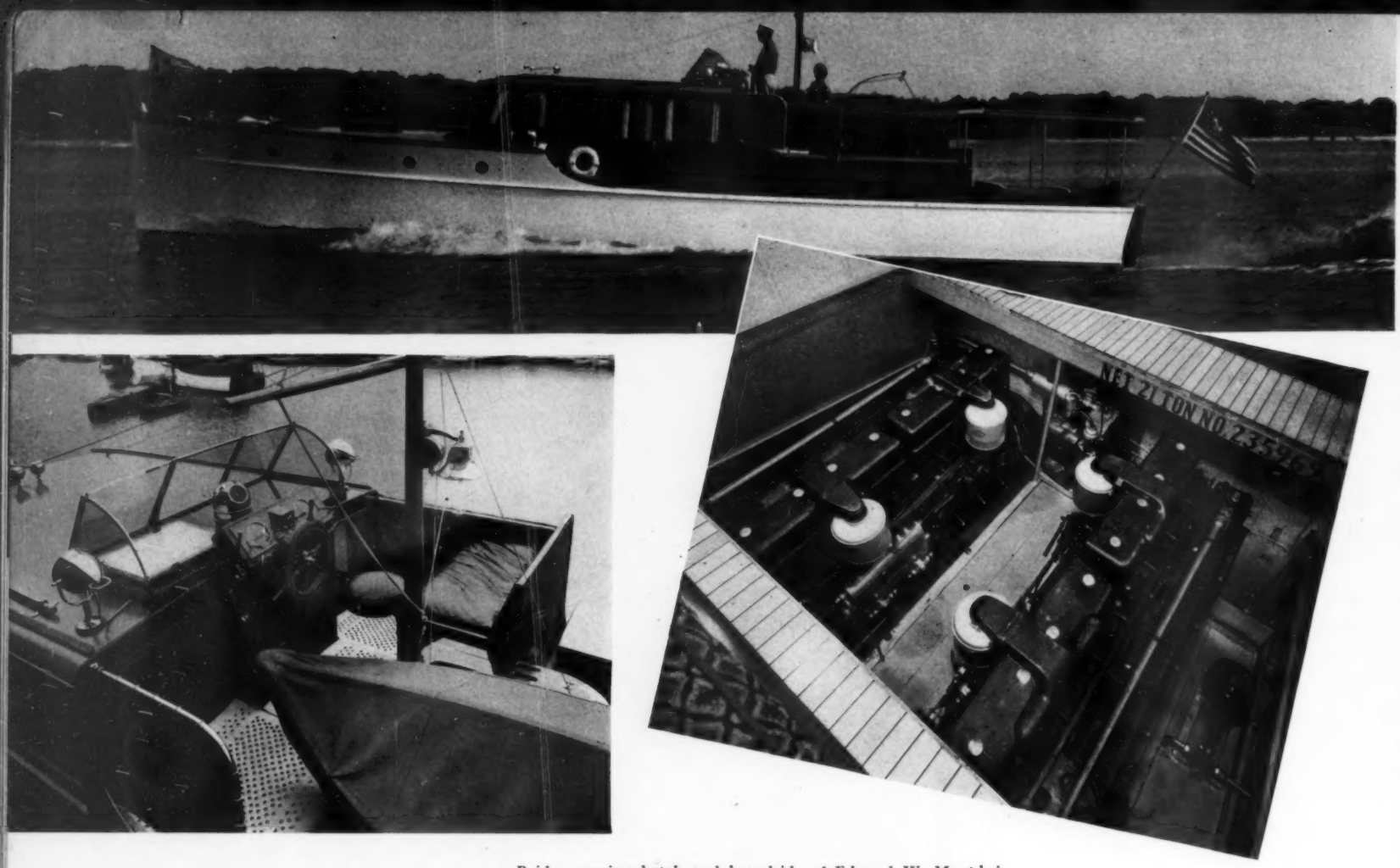
Trials on both boats were carried out through the medium of the Dravo dynamometer barge and included not only dock trials but also river trials using various sizes of fleets in order to obtain the full range of comparison.

In a discussion by Mr. V. B. Edwards of Mr. A. J. Dawson's paper entitled "Power Of Shallow Draft River Towboats" which was presented before the Society of Naval Architects and Marine Engineers, are the following interesting comparisons of these two vessels.



| Towboat | | Remarks | bhp. | Thrust lbs. | Lb. Thrust per bhp. | Speed mph. | Towing Efficiency |
|---|---|---|---|---|---|---|---|
| *Dravo 41* – 350 bhp. Open propeller disc area 19.6 sq. ft. | At Towing Dock | Ahead | 370 | 8,700 | 23.5 | 0 | 0 |
| | | Astern | 372 | 8,700 | 23.4 | 0 | 0 |
| | | 4 coal 2 wide 4,504 tons | 327 | 5,950 | 18.2 | 4.20 | .203 |
| | | 4 S&G 2 wide 2,875 tons | 354 | 5,850 | 16.5 | 4.55 | .200 |
| *Dravo 42* – 350 bhp. Nozzle propeller disc area 19.6 sq. ft. | At Towing Dock | Ahead | 375 | 12,700 | 33.9 | 0 | 0 |
| | | Astern | 346 | 8,000 | 23.1 | 0 | 0 |
| | | 4 coal 2 wide 4,504 tons | 334 | 7,850 | 23.5 | 4.82 | .301 |
| | | 4 S&G 2 wide 2,890 tons | 326 | 7,200 | 22.0 | 5.10 | .300 |





*Bridge, engine hatch and broadside of Edward W. Murphy's Dawn cruiser, "Danell." Both Dawn 50's shown here are powered by twin Superior Diesel engines. Danell won the 1937 Block Island Race for power cruisers.*

# "DANELL" AND "ESCAPE II"

### *Dawn Diesel Cruisers Show Speed and Stamina*

PERHAPS the most frequent questions asked by yachtsmen regarding the smaller marine Diesel engines now available for pleasure boats are those concerning speed of the vessel with this type of power and the stamina of the engines under grueling service conditions. The remarkable economy of all classes of Diesels is now pretty well known to the power boating fraternity.

So far as speed is concerned, ample proof in very concrete form was established by the 50 ft. Dawn cruiser *Danell* during the past summer season on Long Island Sound. This typically beautiful Dawn, owned by Commodore Hickey, was the only Diesel yacht entered in the last annual Block Island Race for power craft and took first honors easily against a field of first class gasoline contenders. She is powered with a pair of 150 hp. Superior Diesels, which drive through reduction gears of 2 to 1 ratio and provide a speed of twenty miles per hour. The result of this official speed trial should banish forever any remaining doubts regarding this point in the consideration of Diesels as yacht engines.

The question of stamina and endurance was also settled once and for all by Mr. Edward W. Murphy, owner of the Dawn 52, *Escape II*. She also carries a pair of 150 hp. Superior Diesels and covered 12,000 miles during the first 11 months of operation. Leaving New York the latter part of December it was necessary to buck ice and winter storms which gave both hull and engines a severe test on their initial voyage. After cruising to Nassau and the Bahamas another bit of dirty weather blew up to give *Escape II* an opportunity to show her mettle. After successfully weathering this storm, seaweed was found on the awning above the flying bridge as a reminder of the heavy seas encountered. Needless to say, neither vessel nor engines suffered from the experience. Mr. Murphy reported his lubricating oil consumption for the first 5,000 miles to be only 39 gallons. Fuel oil used never exceeded three-quarters of a gallon per mile for both engines at a cruising speed of 14 knots. Such records of Diesel economy, stamina and speed are typical of the modern cruiser so powered.



*"Escape II" under way off Miami. This Diesel yacht cruised 12,000 miles during her first 11 months service*

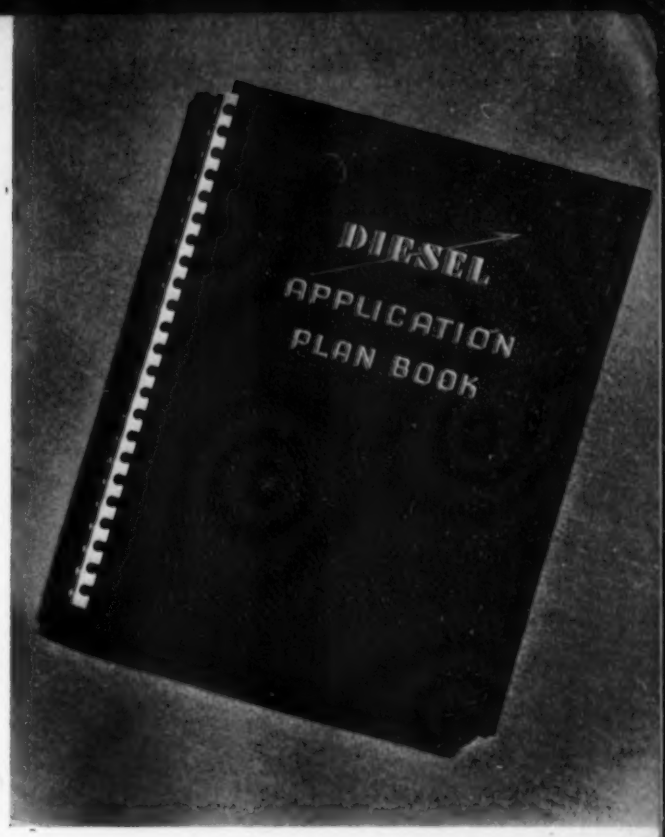
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## CONTENTS

1 Diesel Power Plant Buildings
2 Cooling Water Systems
3 Lubricating Oil Systems
4 Fuel-Oil Storage and Handling Systems
5 Intake and Exhaust Systems
6 Stationary Installation Check List
7 Engine Driven Cotton Gin Check List
8 Commercial Ice Plant Check List
9 Engine Driven Pumping Plant Check List
10 Marine Diesel Engine Installation Data
11 1340 kw. Municipal Power Plant and Water Works
12 Printing House Power Plant
13 Three Unit Generator Drive
14 120 ft. Twin Screw Yacht
15 Forging Company Power Plant
16 Small Two Unit Power Plant
17 Drive for Feed Grinders
18 Feed Grinder and Blower Drive
19 Rubber Stamp Manufacturer
20 2500 kw. Municipal Power Plant
21 Alternative Municipal Power Plant Station Without Basement
22 Pumping Unit for Irrigation Purposes
23 600 hp. Tug
24 1500 kw. Municipal Power Plant
25 Skyscraper Power Plant
26 2000 kw. Municipal Power Plant
27 130 ft. Twin Screw Yacht
28 Creamery Power Plant
29 Diesel Electric Pumping Station
30 Country Residence Power Plant
31 Deep Well Pump Plant
32 279 ft. Twin Screw Yacht
33 1500 hp. Diesel Electric Marine Drive
34 Two Unit 15 kw. Country Residence Power Plant
35 Stove Manufacturing Power Plant
36 Drive for Centrifugal Compressor
37 Plantation Power Plant
38 Belt Drive for Generators
39 Mine Power Plant
40 7100 kw. Municipal Power Plant
41 Hp. Reduction Gear Tug
42 Portable Diesel Driven Compressor Unit
43 Three Unit Country Residence Power Plant
44 Belt Drive for Slow Speed Compressor
45 Belt Driven Generators
46 65 ft. Twin Screw Yacht
47 3 kw. Country Residence Power Plant
48 21,000 bbl. Canal Type Tanker
49 235 hp. Tug
50 Deep Well Pump Drive
51 3½ kw. Country Residence Power Plant
52 Outboard Drive for Tanker
53 Diesel Electric Side Wheel Ship
54 Department Store Power Plant
55 Self-Propelling Pipe Line Dredge
56 Instrument Manufacturer's Power Plant
57 Tanker Cargo Pumps
58 1455 kw. Municipal Power and Water Works Plant
59 150 hp. Tug
60 42,000 kw. Municipal Power Plant
61 Sewage Pumping Plant
62 Restaurant Power Plant
63 Fast Coastwise Passenger Ship
64 5700 kw. Power Plant
65 Pilot House Control by Mechanical Means
66 Diesel Driven Tender
67 117 ft. Survey Boat
68 Municipal Hydro and 1890 kw. Diesel Plant
69 15,000 Ton Tanker
70 600 kw. Municipal Power Plant
71 Self-Propelling Pipe Line Dredge
72 Quarry Power Plant
73 600 kw. Municipal Power Plant
74 Hopper Type Dredge
75 Auxiliary Set Assemblies
76 Laundry Power Plant
77 Cotton Oil Mill Power Plant
78 1000 hp. Tunnel Stern River Towboat
79 1700 kw. Municipal Power Plant
80 Pipe Line Dredge
81 Marine Remote Controls
82 Sewage Pumping Station
83 450 kw. Floating Power Plant
84 Purse Seine Boat
85 1800 hp. Flour Mill Power Plant
86 3000 kw. Municipal Power Plant
87 149 ft. Ferry
88 Six-Wheeled Bus
89 State Park Power Plant
90 Resort Hotel Power Plant
91 700 hp. Tunnel Stern Tug
92 Diesel Electric Bus
93 Crane or Shovel Hookup
94 Elevator and Conveyor Drive
95 Semi-Portable Compressor Unit
96 2000 hp. Locomotive
97 7 Ton Locomotive
98 650 hp. Tug
99 Beam Trawler
100 300 hp. Tug
101 2000 kw. Factory Power Plant
102 80 ft. Ferry
103 480 ft. Tanker
104 30 Ton Locomotive
105 Semi-Portable Compressor Unit
106 Tropical Aviation Station
107 2000 hp. Locomotive
108 300 hp. Locomotive
109 FT Diesel Electric Ferry
110 Swimming Pool Pumping Plant
111 Cold Storage Warehouse Power Plant
112 Gold Mine Power Plant
113 Dredging Pump Drive
114 Radio Shielding
115 Cotton Oil Mill Drive
116 Camshaft Chain Drive
117 Centrifugal Pump Drive
118 Quill Bearing Applications
119 Ice Making Plants
120 Dieselization in the Aircraft Industry
121 Oil Well Drill Rigs

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# DIESEL ENGINES No. 11

# SUPERIOR MODEL D

*By* JOHN W. ANDERSON

THE new Model "D," 5½" by 7" Superior Diesel engine is a big brother of the Model "A" 4½" by 5¾" engines and will considerably broaden the range of powers available in this class of engine. Although it follows the same general design as the smaller and earlier model, it has some features of its own. Both models use the patented Superior Dual Combustion System and are manufactured at the Philadelphia plant of the Superior Engine Division of the National Supply Company.

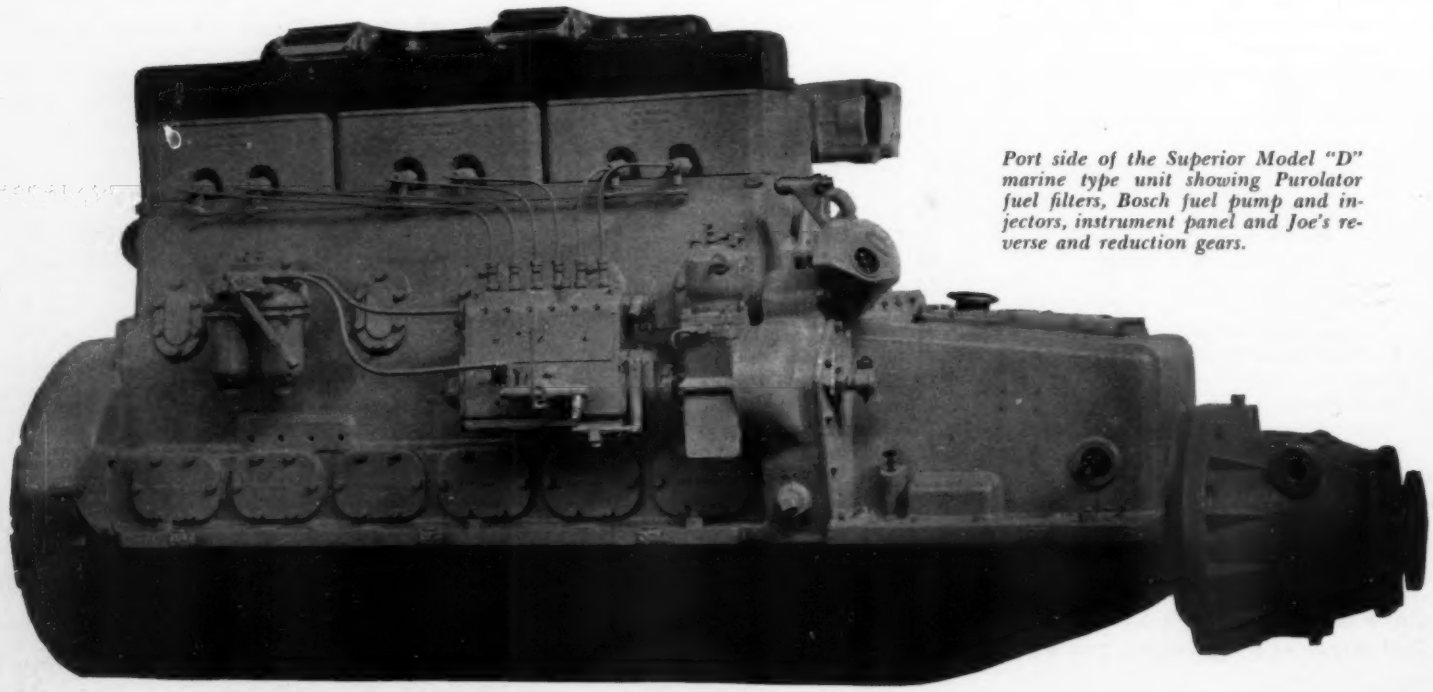
The new line is offered in six and eight cylinders per unit, identical in design, except for the number of cylinders and with parts made interchangeable to a maximum degree. While the new models may be classed as "high speed" engines, yet they are built ruggedly enough for heavy duty continuous service. Offered for marine, industrial and generator set purposes, the power ratings are chosen to suit the service requirements.

There are many interesting features of design and construction but perhaps the outstanding and certainly one of the most interesting is the patented Dual Combustion System. The combustion chamber consists of a main and an auxiliary chamber interconnected by a passage-way as can be seen clearly in the sectional drawing (see page 54). The designation Dual Combustion comes from the fact that, while combustion takes place in both chambers, it does so in two progressive stages. The main and auxiliary chambers are cast in the cylinder head and are not machined. They are, however, closely controlled for definite volume. There are no loose parts or inserts and combustion is directed in a manner to avoid excessive heating of the nozzle, piston, valves, or combustion chamber. Both combustion chambers as well as the nozzle are fully water jacketed. It will be seen that the auxiliary chamber is open at the bottom, however, since it is outside the cylinder bore, it becomes a closed chamber except for the passage-way to the main chamber when the head is in place on the gasket.

The inlet valve is located in the top of the main combustion chamber and slightly overlaps the cylinder bore which permits the use of an extra large valve for higher volumetric efficiency and more complete scavenging of the combustion chamber with the cool intake air. The exhaust valve, which has a removable seat, is located outside the combustion chamber and is away from the heat of combustion. Both valves have removable guides.

In the passage-way between the main and the auxiliary chamber is a plug valve that permits closing off the auxiliary chamber from the main chamber. The purpose of this is to increase the compression pressure in the main chamber to assure instantaneous starting in cold weather. The compression ratio when both the main and auxiliary chambers are in use is 11.8:1, resulting in about 360# per square inch compression pressure at cranking speed. When the auxiliary chamber is closed off the compression pressure is about 460# per square inch at cranking speed or about equal to that of an open chamber direct injection engine. If the engine is warm from previous running, it will start normally without using the higher compression. The plug valves for all the cylinders are operated by one motion for the entire engine by a simple lever and linkage arrangement that is controlled at the engine or can be easily arranged for remote control.

The injection nozzle lies horizontally as can be seen in the sectional drawing and the fuel is sprayed across the top of the piston. The nozzle is of the self clearing pintle type and the injection pressure is approximately 1600# per square inch. The spray from this pintle type nozzle is conical in shape and consists



*Port side of the Superior Model "D" marine type unit showing Purolator fuel filters, Bosch fuel pump and injectors, instrument panel and Joe's reverse and reduction gears.*

of a rather coarse partially atomized core with a finely atomized envelope of fuel spray. The shape of the main combustion chamber is made to suit the shape, as far as possible, of the envelope of the fuel spray. This is best seen in the plan view at the top of the diagram. The core of the fuel spray is directed into the passage-way between the main and the auxiliary chambers. Since the fine spray is first ignited combustion takes place in the main chamber first. The coarse spray enters the auxiliary chamber and is then ignited, causing the secondary combustion.

The top picture in the diagram shows the beginning of fuel injection with the spray core going straight through the passage into the secondary chamber. This portion of the spray consists of the heavier particles which have a high penetrating power, but do not burn as quickly as the finely atomized particles in the spray envelope. As the second picture shows, the spray envelope fills the main chamber completely, and the heat quickly ignites the finely atomized particles. As they burn, there is a rise from 380# compression pressure (the compression pressure at running speeds) to about 450#. This provides further turbulence and considerable heat for the secondary chamber as the hot gases flow into that chamber in an effort to equalize the pressure.

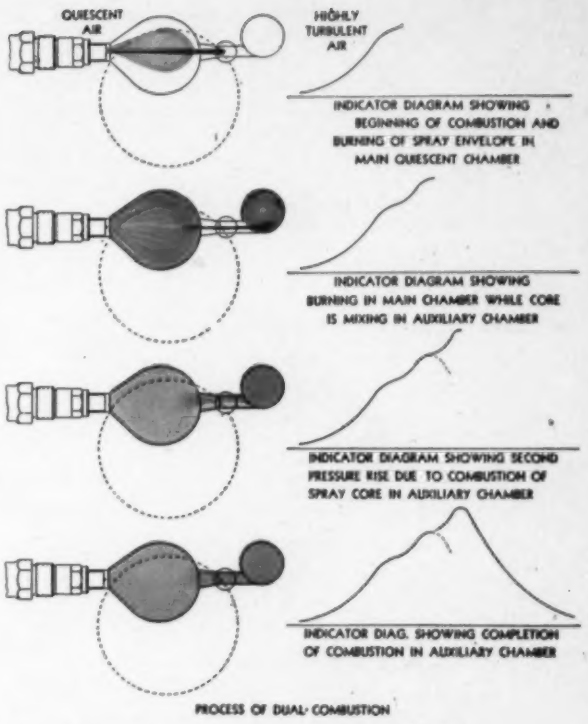
But by this time, the fuel in the secondary chamber has begun to burn, and the flow of gas in the connecting passage-way reverses. There is a secondary rise of pressure in the main chamber as shown on the indicator diagram at the right of the third picture. Finally, as in the last picture, the combustion is complete and the maximum pressure in the cylinder reaches from 450 to 540 pounds. The time interval between the combustions in the main and auxiliary chambers is clearly shown on the indicator cards.

There are many advantages claimed for this system. The combustion is progressive and proceeds smoothly, thus the rate of pressure rise is relatively low for each degree of crank travel. This system has the advantages of the open chamber where high compression for quick starting is retained plus the advantages of the low compression for reducing peak pressures when the passage-way between the two combustion chambers is open for normal operation. These engines are relatively insensitive to fuel specifications and to exact timing of the fuel injection pump.

The published ratings for the two models in this line are:

| Engine Size | Stationary Speed | Service Horsepower | Marine Speed | Service Horsepower |
|---|---|---|---|---|
| 6 Cyl. | 1400 | 160 | 1500 | 170 |
| 8 Cyl. | 1400 | 215 | 1500 | 230 |

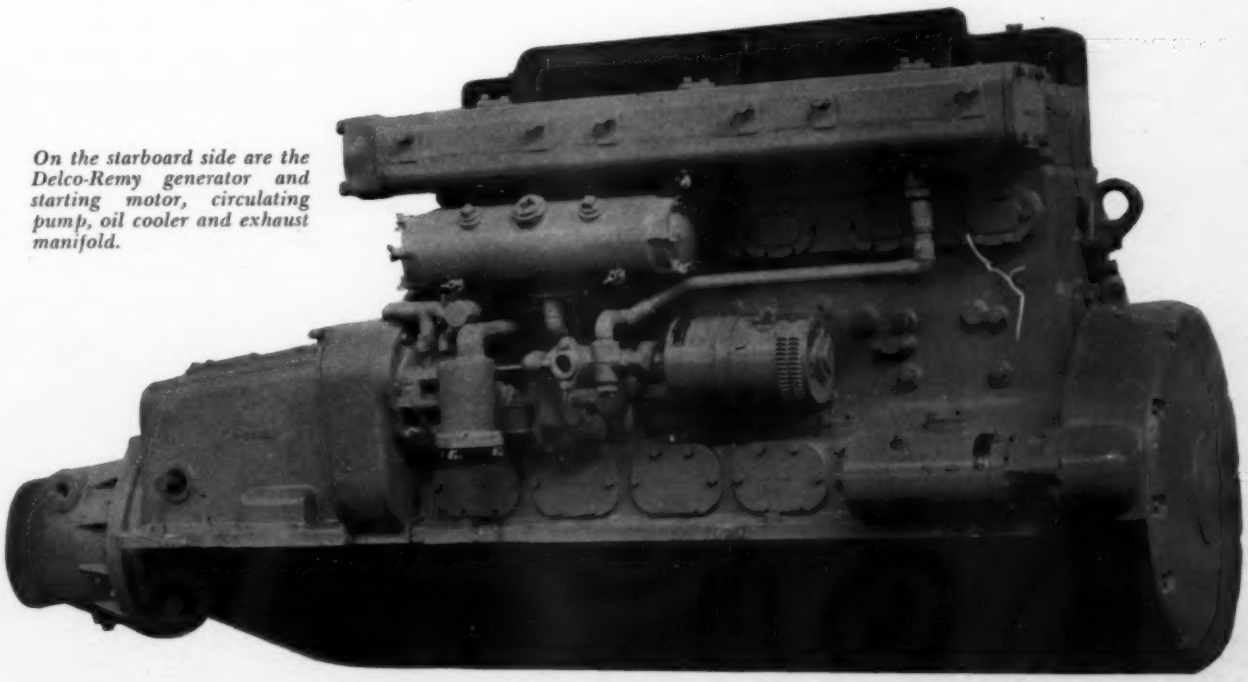
The crankcase and cylinder block are cast in one piece. It is the structural backbone of the engine. Separate replaceable wet cylinder liners are used. The cylinder heads are cast in pairs and are bolted to the top of the cylinder block with a flat copper-asbestos gasket, which seals the gas and water joints. The heads carry all of the valves which seat directly in the heads without cages, and the exhaust valves have removable seats. The valves are operated by rocker arms and oil cushioned tappets and push rods. Removable covers on top of the cylinder heads enclose the valve gear, and provide passages for the air from the intake silencers to the intake valves. The camshaft is in the upper part of the crankcase at



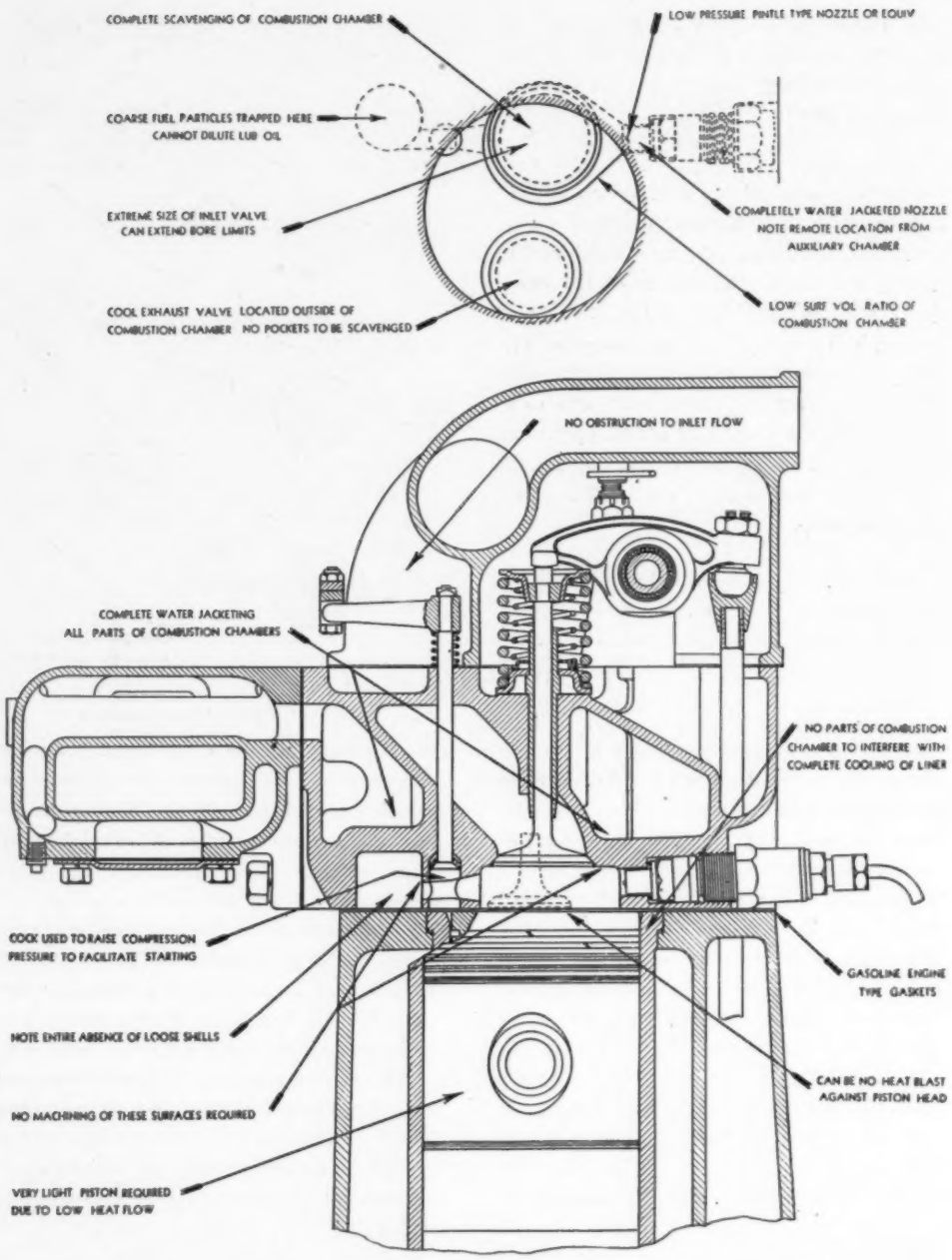
PROCESS OF DUAL COMBUSTION

one side, and has the cams forged integrally with the shaft. It is carried in ball bearings at each end with plain bronze bearings in between, and is driven from the crankshaft by gears.

The crankshaft is an alloy steel forging of very rugged design and is carefully balanced. All journals are Tocco hardened to provide maximum life for bearings and crankshaft. The main bearings are secured to the under side of the crankcase structure. The crank pin and main bearings are of the precision type with steel backs and bearing alloy linings. They are without adjustment, and new bearing shells are installed when necessary without scraping



*On the starboard side are the Delco-Remy generator and starting motor, circulating pump, oil cooler and exhaust manifold.*




*Cross-section of Superior Diesel cylinder head, inlet and exhaust manifolds, and valve arrangement with a plan view of the combustion chamber.*

or fitting. Wrist pin bearings are the full floating type. Alloy pistons are used in all engines.

The lubrication system is the full pressure feed type. Two gear pumps, mounted in an accessible position on the outside of the engine, are driven from the timing gears.

The scavenging pump draws oil from the forward compartment of the oil pan and delivers it to the deep sump compartment of the oil pan directly under the pressure pump, insuring an ample supply of oil under all operating conditions.

The pressure pump draws oil from the deep sump through an outside screen which is readily accessible for cleaning and delivers it under pressure through the oil cooler screen and bypass filter directly to the distributing line which is drilled in the crankcase casting. Both oil pumps are self priming. Crankshaft and connecting rods are drilled, in fact, all of the oil passages throughout the engine are drilled and no inside piping is used. Rocker arm assemblies are forced feed lubricated also. The engine is fully enclosed and all parts are lubricated from the one system. Surplus oil drains to the sump.

Cooling water flows first through the oil cooler and then into a distributing manifold, from which it is directed around each cylinder. The flow is then upward around the cylinder liners into the cylinder head and around the valve seats, combustion chambers and nozzles and from there into the outlet header or through the water jacket exhaust manifold. A thermostatically controlled bypass sends as much water back to the suction as is necessary to maintain the proper water outlet temperature. Circulating water pumps are built into the engine but vary in type according to the service. Centrifugal pumps are used with radiators and other closed cooling systems and a gear pump where positive suction is required. The gear pump is driven by separate gears to avoid the grinding action and wear which would result from the use of dirty cooling water.

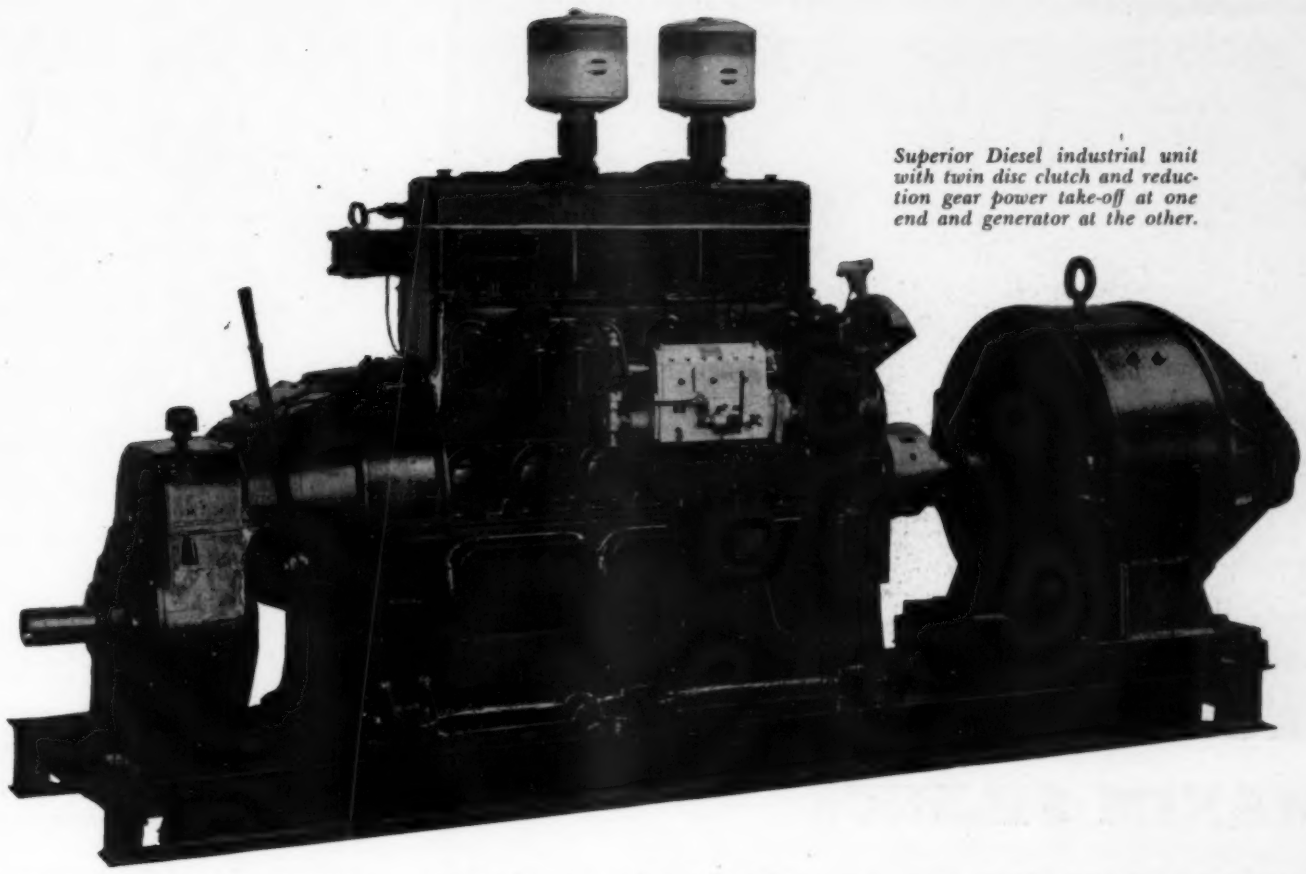
The lubricating oil pump, cooling water pump, lubricating oil filter and cooler are built as a complete assembly and located on the outside of the engine for convenience. The lubricating oil pump has a pressure adjustment. Timing gears are of the helical tooth type with 2″ width face. The idler gear is supported by a shaft running in ball bearings.

Engines in this line are electrically started and are also equipped with a voltage regulated type of generator for recharging the starting batteries.

The fuel oil filter, air intake filter and silencer, unit fuel injection pump and gauge panel with lubricating oil pressure, cooling water temperature, and ammeter dials are all located on the engine. The speed is controlled by the governor which is built in at the gear end near the injection pump. It is pressure lubricated and is arranged to control the engine speed at any desired setting from idle to full speed.

Another distinctive feature of this engine is its unit control lever which is mounted at the timing gear end and moves through an arc of about 160 degrees. The movement of this lever in one direction rotates a lay shaft contacting a lip on the inlet valve push rod guide cups, raising the valve, thereby releasing compression to permit free turning of the engine. This is beneficial in cold weather as it permits high cranking speed prior to starting. The movement of this lever in the opposite direction permits the inlet valve to function normally and fuel is injected for starting. Additional movement of the lever gives throttle or speed control, maintaining the engine under governor regulation. When the engine is running the starting motor button on the instrument paul can not be engaged.

All models have hand hole plates in the side of the crankcase for access to the bearings and other internal parts. In addition to these hand holes in the crankcase, the stationary and gen-



*Superior Diesel industrial unit with twin disc clutch and reduction gear power take-off at one end and generator at the other.*

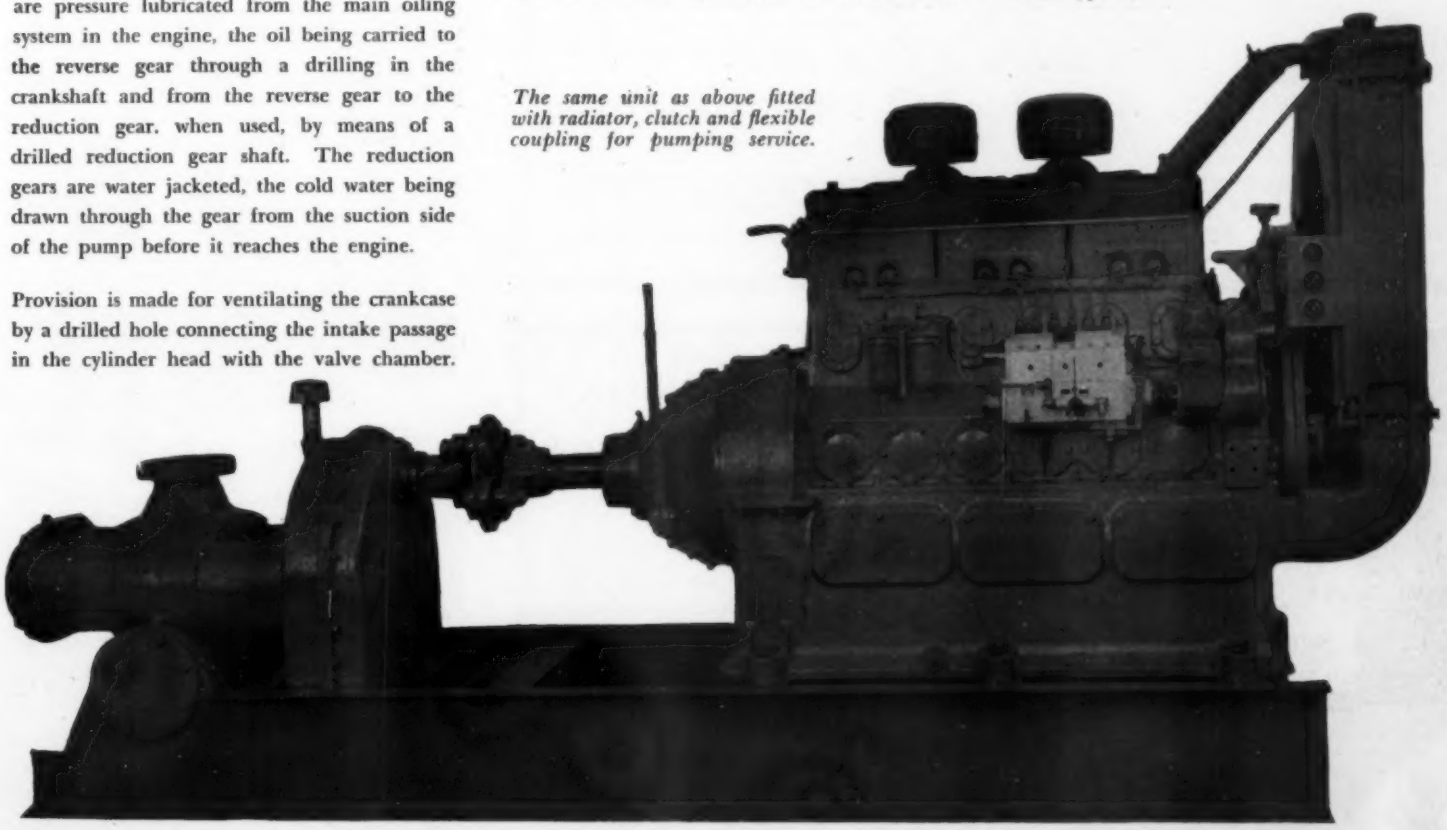
erating unit applications have large inspection plates in the lower base casting.

The marine engines are offered in true right and left hand construction for twin installations. Marine engines are provided with an extended length of oil pan as a support for the reverse gear. Both the reverse and the reduction gears are pressure lubricated from the main oiling system in the engine, the oil being carried to the reverse gear through a drilling in the crankshaft and from the reverse gear to the reduction gear. when used, by means of a drilled reduction gear shaft. The reduction gears are water jacketed, the cold water being drawn through the gear from the suction side of the pump before it reaches the engine.

Provision is made for ventilating the crankcase by a drilled hole connecting the intake passage in the cylinder head with the valve chamber. Suction through this hole draws off the crankcase fumes which pass into the combustion chamber and out through the exhaust.

Electric generator units are compact, using two bearing type generators with flexible coupling drive. Alternating current generators have direct connected or belt driven exciters. Industrial and stationary types are arranged according to the requirements of the application having clutches for belt drive, stub shafts, radiators, sheet-metal housing and similar equipment. The industrial and stationary engines are mounted on a cast iron base and where clutches are used, they are of the lubricated type.

*The same unit as above fitted with radiator, clutch and flexible coupling for pumping service.*





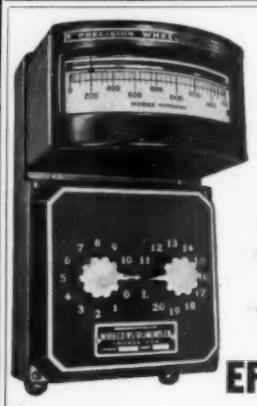
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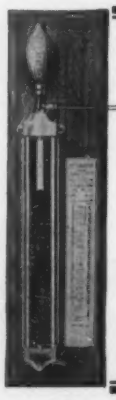


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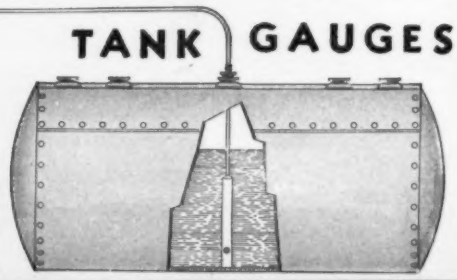
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# S. A. E. NEWS

WHETHER or not the C.F.R. engine might be modified to give better correlation with service and experience in rating Diesel fuels, was debated in the November, 1937, meeting of the Automotive Diesel Fuels Section of the C.F.R. Committee. Fuel-injection nozzles also are being checked up by the Diesel Section, and most of the cooperative test results reported on a "throttling-type" nozzle showed less cycle-to-cycle variation than occurred with the old nozzle.

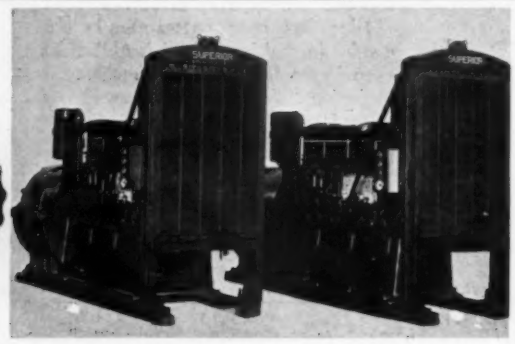
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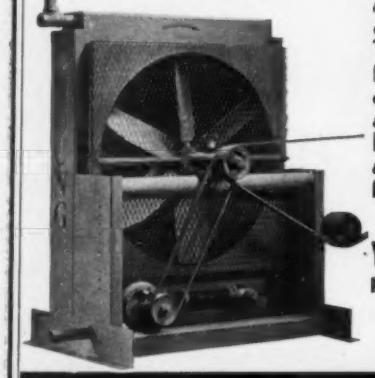
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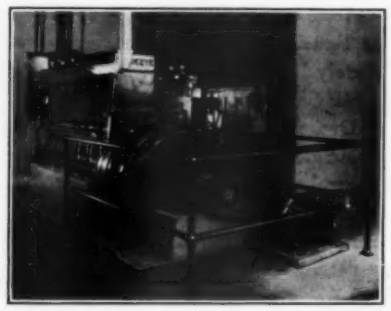
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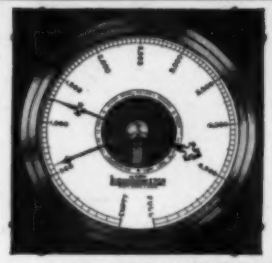

DIESEL PROGRESS

## INDEX OF ADVERTISERS


| | PAGE |
|---|---|
| Aluminum Company of America | 19 |
| American Air Filter Co. | 59 |
| American Bearing Corp. | 15 |
| Atlas Imperial Diesel Engine Company | 6 |
| Bantam Bearings Corp. | 16 |
| Brodie System, Inc. | 59 |
| Buckeye Machine Co. | 58 |
| Burgess Battery Co. | 57 |
| Cooper-Bessemer Corp. | Fourth Cover |
| Cummins Engine Company | 5 |
| Diesel Filter Co. | 14 |
| Donaldson Company | 10 |
| Elco Works | 57 |
| Electric Boat Company | 57 |
| Elliott Company | Third Cover |
| Erie Forge Company | 9 |
| Fairbanks, Morse & Co. | 1 |
| Foster Wheeler Corp. | 13 |
| Goulds Pumps, Inc. | 59 |
| Hemphill Diesel Schools | 59 |
| Hercules Motors Corp. | 47 |
| Hooven, Owens, Rentschler Corp. | 20 |
| Illinois Testing Laboratories, Inc. | 8 |
| Ingersoll-Rand Company | 23 |
| International Harvester Company | 2 |
| Korfund Company, The | Second Cover |
| Liquidometer Corp., The | 59 |
| Lovejoy Flexible Coupling Co. | 59 |
| Macmillan Petroleum Corp. | 7 |
| Maxim Silencer Company, The | 56 |
| National Schools | 24 |
| National Supply Co. | 12 |
| Nordberg Mfg. Co. | 59 |
| Norma-Hoffmann Bearings Corp. | 59 |
| Nugent & Co., Wm. W. | 60 |
| Petrometer Corp. | 56 |
| Quincy Compressor Company | 59 |
| Socony-Vacuum Oil Company | 3 |
| Standard Oil Company (California) | 18 |
| Standard Oil Company (Indiana) | 11 |
| Sterling Engine Company | 17 |
| Stover Mfg. & Engine Co. | 56 |
| Superior Diesels | 12 |
| Texas Company, The | 4 |
| United American Bosch Corp. | 59 |
| Vellumoid Company, The | 58 |
| Viking Instruments, Inc. | 59 |
| Waukesha Motor Company | 59 |
| Wheelco Instruments Co. | 56 |
| Young Radiator Company | 58 |
| Youngstown Miller Company | 21 |



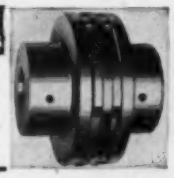



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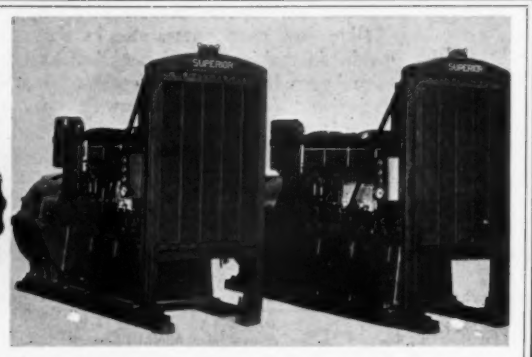
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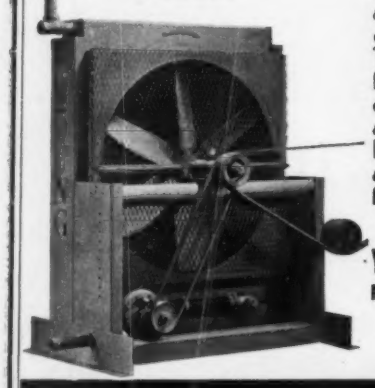
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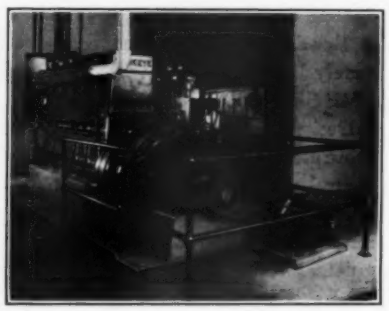
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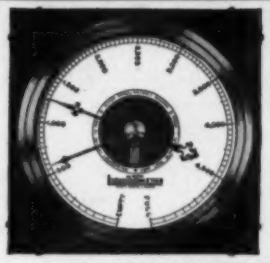
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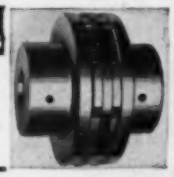
## INDEX OF ADVERTISERS


| | PAGE |
|---|---|
| Aluminum Company of America | 19 |
| American Air Filter Co. | 59 |
| American Bearing Corp. | 15 |
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| Bantam Bearings Corp. | 16 |
| Brodie System, Inc. | 59 |
| Buckeye Machine Co. | 58 |
| Burgess Battery Co. | 57 |
| Cooper-Bessemer Corp. | Fourth Cover |
| Cummins Engine Company | 5 |
| Diesel Filter Co. | 14 |
| Donaldson Company | 10 |
| Elco Works | 57 |
| Electric Boat Company | 57 |
| Elliott Company | Third Cover |
| Erie Forge Company | 9 |
| Fairbanks, Morse & Co. | 1 |
| Foster Wheeler Corp. | 13 |
| Goulds Pumps, Inc. | 59 |
| Hemphill Diesel Schools | 59 |
| Hercules Motors Corp. | 47 |
| Hooven, Owens, Rentschler Corp. | 20 |
| Illinois Testing Laboratories, Inc. | 8 |
| Ingersoll-Rand Company | 23 |
| International Harvester Company | 2 |
| Korfund Company, The | Second Cover |
| Liquidometer Corp., The | 59 |
| Lovejoy Flexible Coupling Co. | 59 |
| Macmillan Petroleum Corp. | 7 |
| Maxim Silencer Company, The | 56 |
| National Schools | 24 |
| National Supply Co. | 12 |
| Nordberg Mfg. Co. | 59 |
| Norma-Hoffmann Bearings Corp. | 59 |
| Nugent & Co., Wm. W. | 60 |
| Petrometer Corp. | 56 |
| Quincy Compressor Company | 59 |
| Socony-Vacuum Oil Company | 3 |
| Standard Oil Company (California) | 18 |
| Standard Oil Company (Indiana) | 11 |
| Sterling Engine Company | 17 |
| Stover Mfg. & Engine Co. | 56 |
| Superior Diesels | 12 |
| Texas Company, The | 4 |
| United American Bosch Corp. | 59 |
| Vellumoid Company, The | 58 |
| Viking Instruments, Inc. | 59 |
| Waukesha Motor Company | 59 |
| Wheelco Instruments Co. | 56 |
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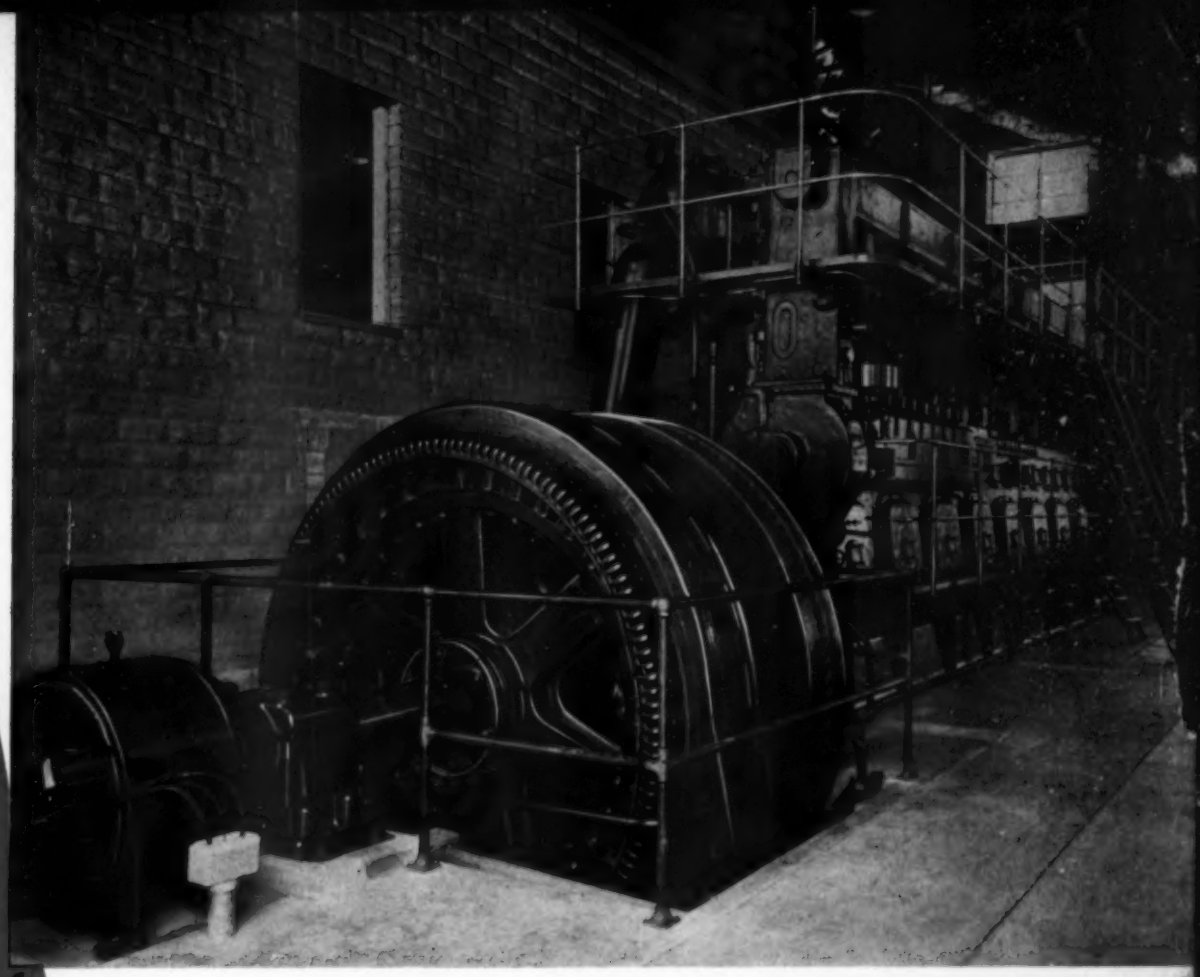
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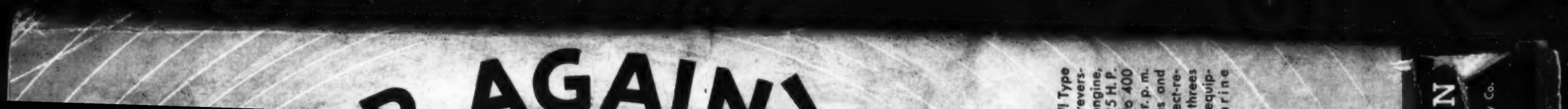


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